AUTOMOTIVE INDUSTRIES

JANUARY 1, 1953

AUTOMOTIVE and AVIATION MANUFACTURING
CIVILIAN AND DEFENSE
ENGINEERING • PRODUCTION • MANAGEMENT

In This Issue . . . Buick V-8 · · · · Aviation Outlook · · · · New Ford Tractor · · · · Rocket Cold Extrusion · · · · Budd Tank Plant · · · · Higher HP Chevrolets · · · · Loop Scavenged Diesel · · · · Chrysler Proving Ground

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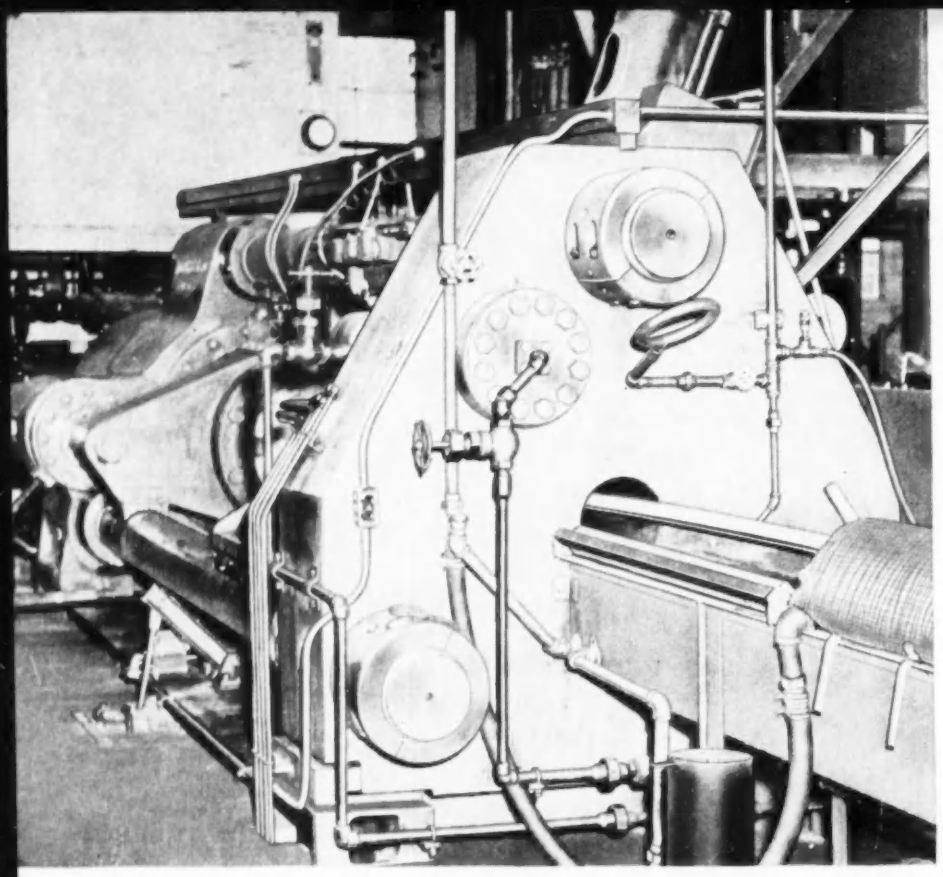
A CHILTON PUBLICATION



Puts squeeze on hydraulic press maintenance...

• Shown above is the 1250-ton hydraulic press used by the Light Metals Corporation of Grand Rapids, Michigan, for extruding variously shaped sections of aluminum. When this press was installed recently, officials gave the important hydraulic oil job to STANOIL Industrial Oil. They based that decision on their own experience with this outstanding oil.

That experience covered over four years' use of STANOIL in the hydraulic system of a 315-ton extrusion press. STANOIL has served continuously in this press without being changed or removed for oil maintenance. The hydraulic oil system has never been cleaned and has remained entirely free from deposits and varnish. Hydraulic operation has been efficient at all times.

The experience of the Light Metals Corporation is your assurance of STANOIL's ability to reduce hydraulic system maintenance to a minimum in your plant. This versatile oil will provide clean, dependable lubrication for such a variety of equipment as air compressors, reduction gears, and electric motors. The Standard Oil lubrication specialists will help you make the most effective use of STANOIL. Phone him at your local Standard Oil (Indiana) office. Or write, Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

STANOIL
TRADE MARK
Industrial Oil

What's YOUR problem?

D. R. Clay, of Standard Oil's Grand Rapids, Michigan, office, is the lubrication specialist who has helped Light Metals Corporation keep maintenance of hydraulic units at a minimum through use of STANOIL Industrial Oil.

He is one of many Standard Oil specialists located throughout the Midwest. These men have the practical experience and special training to handle lubrication problems on any type of operation.

Take advantage of the service offered by the lubrication specialist nearest your plant. You can contact him easily by phoning your local Standard Oil Company (Indiana) office. With his help, find how many different oils in your plant can be replaced by STANOIL Industrial Oil on such applications as:

Air compressors . . . no sticking or clogging of valves, less oil consumption in splash or circulating systems.

Speed reducers . . . less wear of gears and bearings during frequent cold starts or prolonged high-temperature operation.

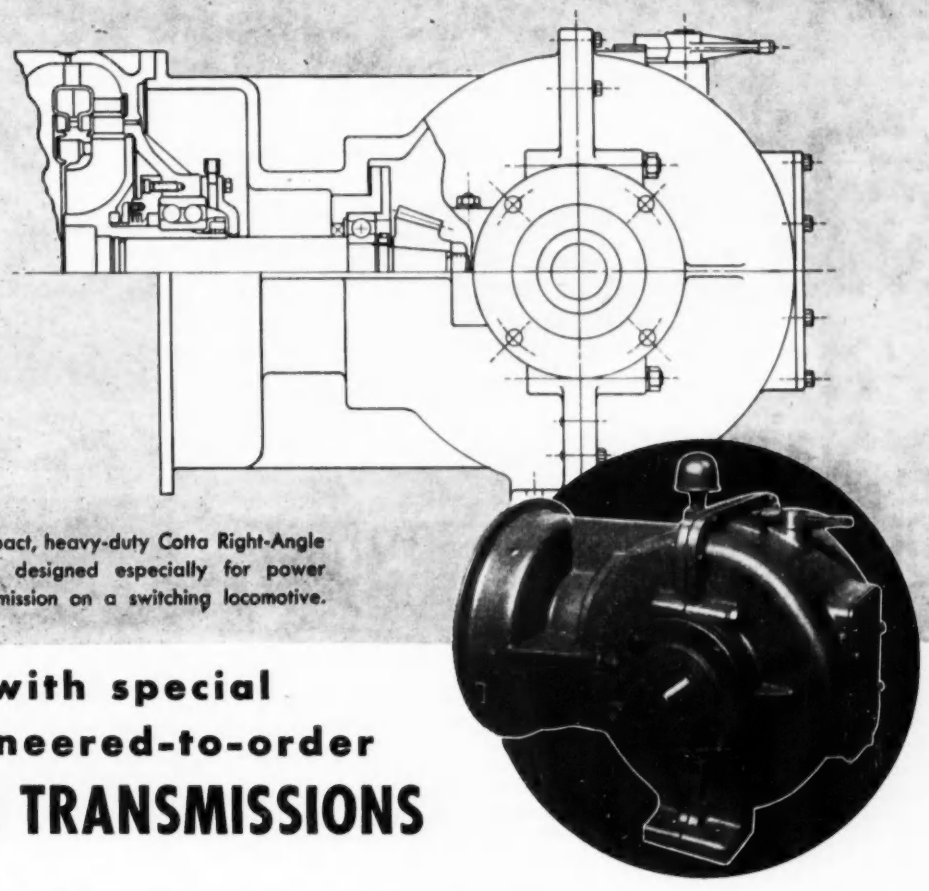
Steam turbines . . . freedom from emulsions and sludge, fewer oil changes necessary.

Ring-oiled bearings . . . rings function immediately on starting, less bearing wear.

Circulating and bath systems . . . one oil for a wide variety of jobs.

STANDARD OIL COMPANY STANDARD *(Indiana)*

Now . . . get easier control of power through a wide range of torque conditions



Compact, heavy-duty Cotta Right-Angle Drive designed especially for power transmission on a switching locomotive.

with special Engineered-to-order COTTA TRANSMISSIONS

Typical of Cotta's ability to develop special transmissions for specific needs is this forward and reverse transmission, right-angle drive. On a switching locomotive it provides a flow of power through a wide range of torque conditions. At the same time, it has all the ruggedness and lifetime stamina which characterize transmissions *built by Cotta!* Operators of railcars, winches, drilling rigs, trucks, hoists and other heavy-duty mobile units are enthusiastic about the easy operation and increased efficiency of these compact mechanical drives.

If you are considering torque convertors for your mobile equipment, and you need a special transmission with job-proved, heavy-duty features — input torque between 150 to 2000 foot pounds — come to Cotta!

THIS INFORMATION WILL HELP YOU

Diagrams, capacity tables, dimensions and complete specifications sent free on request. Just state your problem — COTTA engineers will help you select the right unit for best performance. May we work with you?

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An Assurance of Dependable Service

COTTA
HEAVY-DUTY TRANSMISSIONS
"Engineered-to-order"

How Stainless makes the "Super Freighter" Super

5,000 to 8,000 Pounds Less Dead-Weight ... 8 to 10 feet shorter, but more payload space than any standard motor truck of the same wheelbase ...

These are characteristics of the "Super Freighter"... a self-propelled, large capacity trailer produced by the TWIN COACH COMPANY, Kent, Ohio.

Look at the 35-foot unit, shown here, with its body of 18-8 austenitic chromium-nickel stainless steel.

The 18-8 stainless permits use of thinner gauges *to cut dead-weight while increasing strength.* It also assures longer useful life, because chromium-nickel alloy steel has the toughness to withstand impacts and rough usage in loading and on the road.

Chromium-nickel stainless steels resist wear, abrasion from road dust, and the corrosive attacks of rain, sleet and ice, as well as corrosion from products carried. 18-8 assures long trouble-free performance, attractive appearance, cleanliness and economy.

You can forge, bend, weld, solder, punch, shear, draw and spin 18-8 stainless. Leading steel companies produce austenitic chromium-nickel stainless steels in all commercial forms. A list of sources of supply will be furnished on request.

At the present time, nickel is available for the production of austenitic chromium-nickel stainless steels and other alloys containing nickel, for end uses in defense and defense supporting industries. The remainder of the supply is available for some civilian applications and governmental stockpiling.

"Super Freighter" Stainless Steel Van ... built by TWIN COACH COMPANY, Kent, Ohio, has 33,000 lbs. payload capacity and weighs 17,500 lbs. net. Overall length, 35'. Width, 8'. Height, 12¼'. Tread, 7'-11¾". Turning radius, 39½'. Powered by FAGEOL-TWIN COACH engines of pancake design ... originally developed for under-floor bus mounting..."Super Freighters" utilize standard FRUEHAUF trailers, including refrigerator and live-stock vans. In addition to use as cargo trucks, units can be easily outfitted as mobile hospitals, machine shops, field offices, stores-on-wheels, etc.

EMBLEM OF INCO SERVICE

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

A CHILTON MAGAZINE AI PUBLISHED SEMI-MONTHLY

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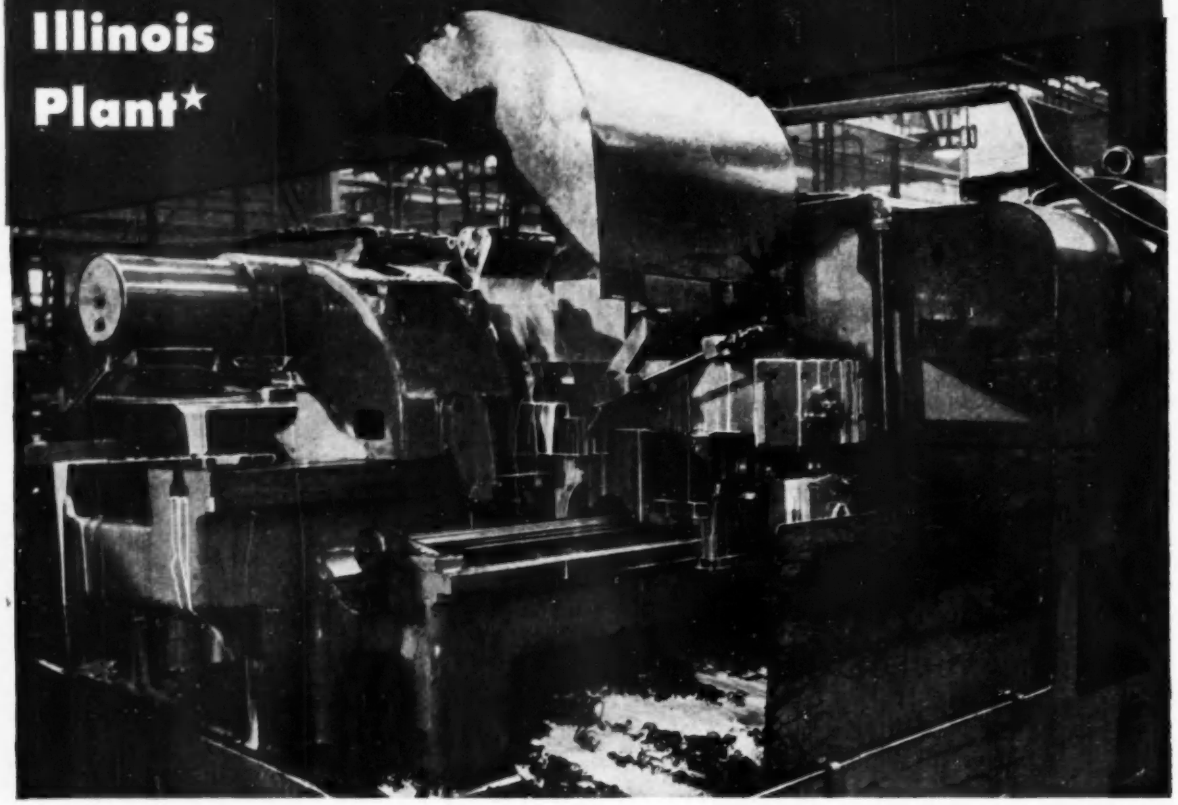
STABILITY . . . of Texaco Soluble Oil Emulsions proved in huge Illinois Plant*



*Name on request.

THIS plant operates over 5,000 metal working machines of various types, and is located in a hard water area where emulsions of soluble oil are ordinarily difficult to maintain. Emulsions of *Texaco Soluble Oil HW*, however, have been used for years with success.

Last year, for instance, circumstances forced a two-month shutdown of the plant, and the emulsions of *Texaco Soluble Oil HW* were left standing in tanks and lines. When production was resumed, the operators found the Texaco emulsions still in satisfactory condition. There was comparatively little separation, little odor problem, and no wholesale cleaning of tanks or lines was necessary.

Here you have proof of the stability for which emulsions of Texaco Soluble Oils are famous — stability that means better cooling and lubrication, cleaner plant, longer tool life, lower oil consumption and maintenance costs.

Why not enjoy these benefits in your plant? There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to enable you to do all your machining better, faster and at lower cost. A Texaco Lubrication Engineer will gladly advise you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

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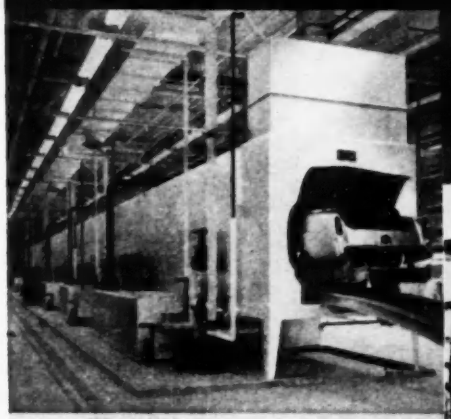
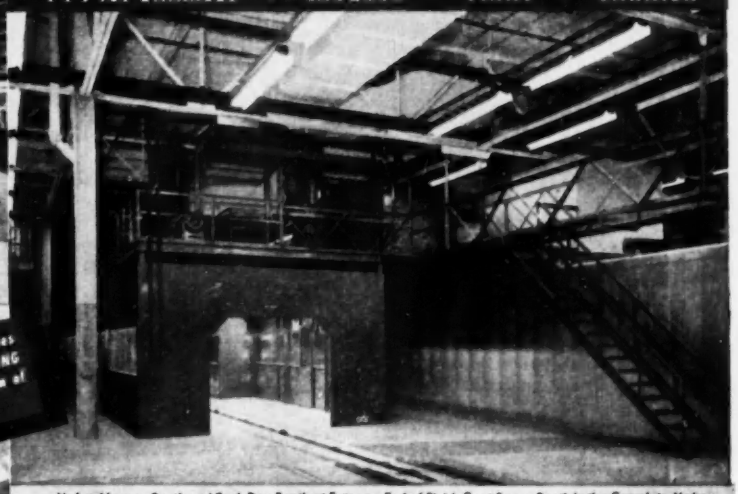
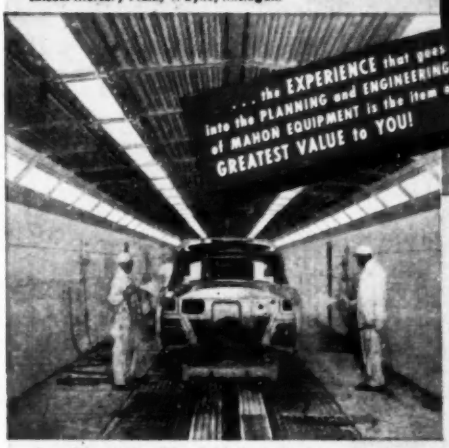


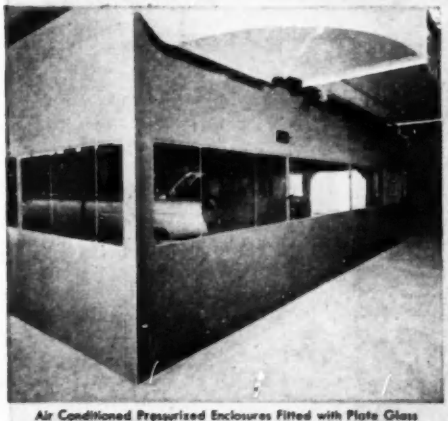
Mahon Six-Stage Metal Cleaning and Rust Proofing Machine —Part of the Complete Mahon Body Finishing System at the Lincoln-Mercury Plant, Wayne, Michigan.



Mahon Vacuum Booth and Tack Rag Booth at Entrance End of Finish Coat Spray Booth in the Complete Mahon Body Finishing System at the Lincoln-Mercury Plant, Wayne, Mich. Finish Coat Bake Oven Appears at Right.



One of Four Mahon Down-Draft Hydro-Filter Spray Booths in the Complete Mahon Body Finishing System at the Lincoln-Mercury Plant, Wayne, Michigan.



Air Conditioned Pressurized Enclosures Fitted with Plate Glass Protect Bodies from Dust while moving from Spray Booths to Finish Baking Ovens at the Lincoln-Mercury Plant.

Complete, Ultramodern MAHON SYSTEM Assures FINE BODY FINISH at LINCOLN-MERCURY!

In the new Lincoln-Mercury plant at Wayne, Michigan, the exceptionally fine finish on both Lincoln and Mercury bodies is produced in a complete Mahon Finishing System. The system is ultramodern in every respect. Included in it are the latest developments in production equipment of this type—all designed to produce greater operating efficiency and to reduce unit cost of finishing to an absolute minimum. The fact that the Mahon Company was selected to engineer, build and install this equipment is significant, yet it is not unusual in the automobile industry . . . because, a survey will show that in the automotive field and the home appliance field, where fine finish is imperative, there are more Mahon Finishing Systems than all other types combined. If you are contemplating new finishing equipment, you, too, will find that Mahon engineers are better qualified to determine your equipment requirements, and to do the all-important planning and engineering which is the key to high quality results in production finishing. Over thirty years of experience in this highly specialized field, coupled with constant research and development, have endowed Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere. See Mahon's Insert in Sweet's Plant Engineering File for complete information, or write for Catalog No. A-653.

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Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning and Pickling Equipment, Metal Cleaning and Rust Proofing Equipment, Hydro-Filter Spray Booths, Filtered Air Supply Systems, and Drying and Baking Ovens; Core Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium, Dust Collectors and other units of Special Production Equipment.

MAHON

Quick Action . . .

another

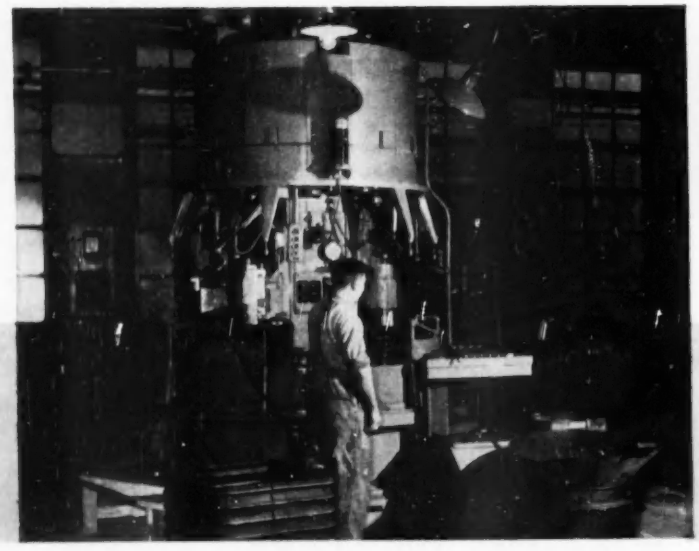
BULLARD

MULT-AU-MATIC
goes into service

"COVER:
Our new Bullard for the Union Department arrived at the end of April, and was quickly and skillfully unloaded from the flat car that brought it."
Illustrations from Clayton Mark & Company House Organ, "The Mark Times"

Clayton Mark & Company, Evanston, Illinois manufacturers of Complete Water Systems and Supplies realized the potential production possibilities and manufacturing economies obtainable with Bullard Mult-Au-Matic. Quick Action — they wasted no time in getting their machine into operation.

There's a Mult-Au-Matic size for your work. There's potential manufacturing economy in the Mult-Au-Matic Method on your jobs. Whether yours is mass production or shorter runs, let Bullard engineers outline the Mult-Au-Matic application in your plant.



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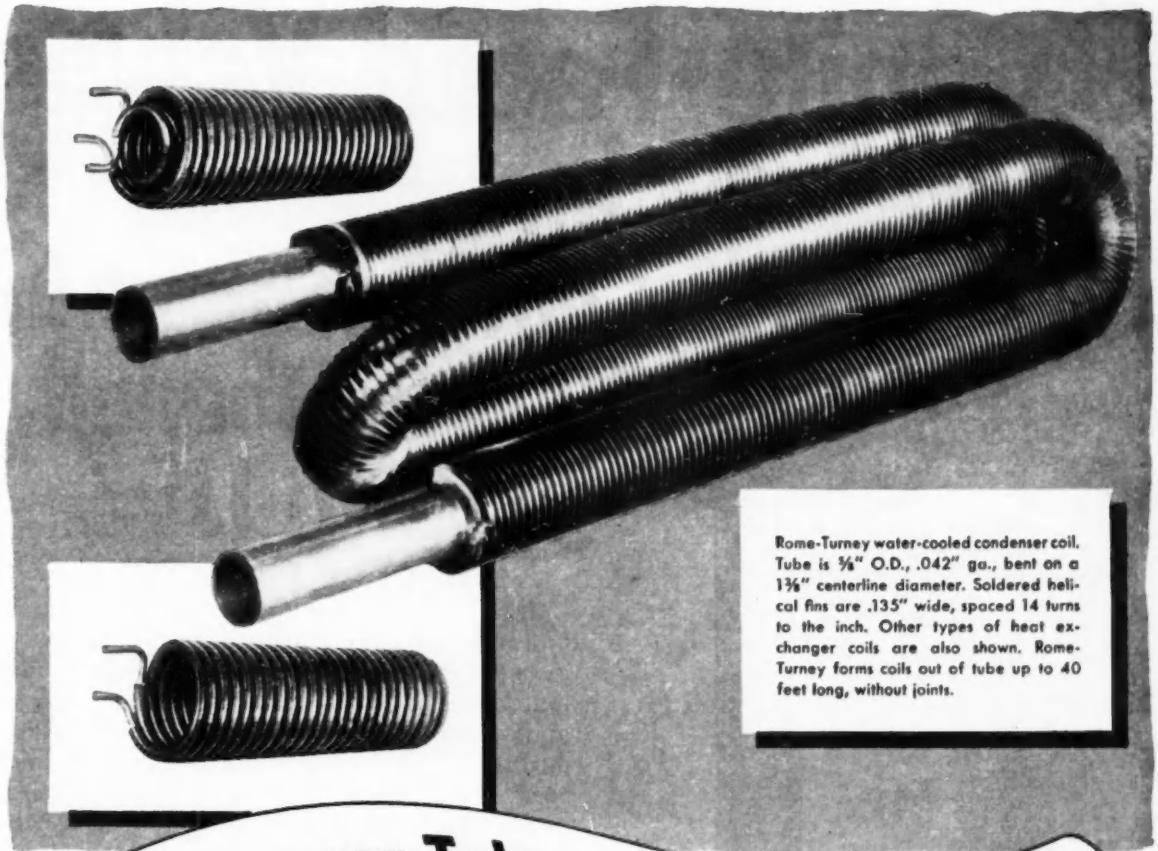
WHEN WRITING MENTION 218.



Rome-Turney water-cooled condenser coil. Tube is ⅝" O.D., .042" ga., bent on a 1⅜" centerline diameter. Soldered helical fins are .135" wide, spaced 14 turns to the inch. Other types of heat exchanger coils are also shown. Rome-Turney forms coils out of tube up to 40 feet long, without joints.

For Copper Tube that can be BENT

Rome-Turney sees REVERE

Most of the Revere Metals are fabricated by usual methods into conventional products. Some of them, however, appear on the market in forms that are unusual and possess special advantages. Take these helical-finned copper coils produced by the Rome-Turney Radiator Co., Rome, N. Y. It takes extra skill to produce coils with such small radii. The company can produce the coils shown on a commercial basis, for use in air conditioning apparatus, air compressors, and general heating and cooling applications where compactness plus high heat transfer rates are essential.

How it is possible to make such tight turns is Rome-Turney's secret. Revere does not share in it, nor does Revere want to reveal a secret of its own, which is how we turn out copper tube in a special bending temper for an application such as this. All we can say is that the two methods dovetail very nicely. If you need copper tube that can be bent easily, and offers you as well the advantages of corrosion resistance, high heat transfer, easy joinings, see Revere. We also make copper pipe, tube in copper alloys, aluminum alloys, and electric welded steel tube. If required, the Technical Advisory Service will gladly collaborate with you, as it has with Rome-Turney, on selection and specification matters. Get in touch with the nearest Revere Sales Office.

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COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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• • •

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities, Distributors Everywhere

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Eatonite—a heat resistant, corrosion resistant, and wear resistant alloy applied to valve faces by special Eaton-developed techniques—adds materially to valve life in commercial vehicles and heavy-duty industrial engines. An important factor in the outstanding performance records being set by Eatonite-faced valves is the homogeneous structure produced by the Eaton process of applying the hard-facing material. Eatonite-faced valves come well within practical limits from the standpoint of cost; pay for themselves many times over in lengthened life span and freedom from valve trouble. Best results are obtained when Eatonite-faced valves are used in conjunction with Eaton valve seat inserts.

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In This Complete Catalog

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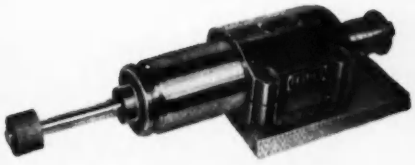
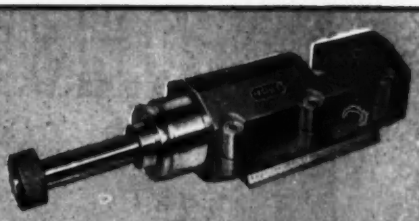
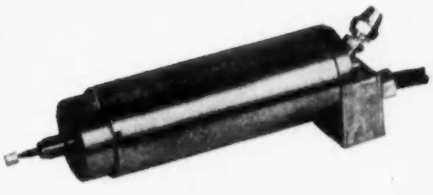
● Leading grinder manufacturers install Ex-Cell-O Precision Spindles as original equipment. You can improve the performance of your grinders with Ex-Cell-O Precision Spindles. They are rigid and smooth-running, permit heavy cuts without chatter, require no lubrication or adjustment. All are fitted with precision ball bearings manufactured by Ex-Cell-O.



Single-body, belt-driven internal grinding spindle.

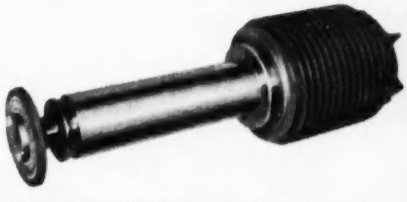


Double-body, belt-driven internal grinding spindle.



65,000 rpm high frequency inbuilt motor spindle.

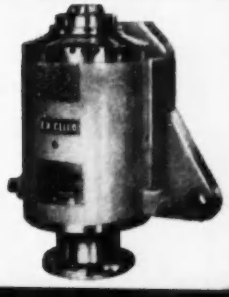
25,000 rpm high frequency inbuilt motor spindle.



Totally enclosed inbuilt motor surface grinder spindle.

Precision inbuilt motor spindle for cutter grinder.

Vertical precision spindle with inbuilt motor.



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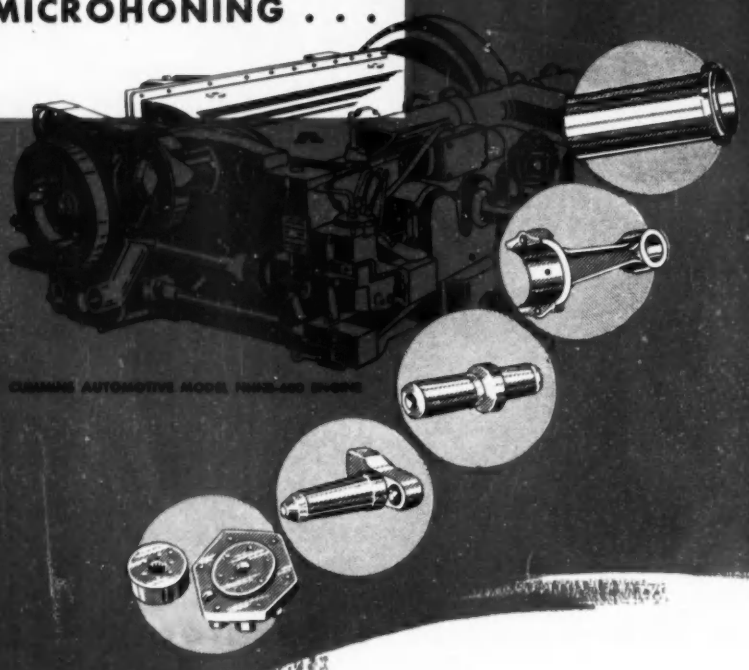
INCREASED EFFICIENCY OF

DIESEL ENGINES

THROUGH MICROHONING . . .



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MICRO MATIC

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- cylinder liners
- connecting rods
- valve guides
- injector barrels
- pump discs . . .

accurate size, true geometry, and the characterized finish—all at production rates.

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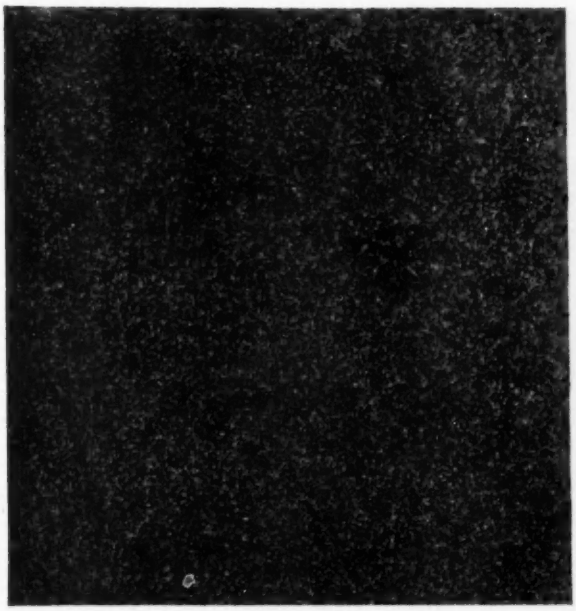
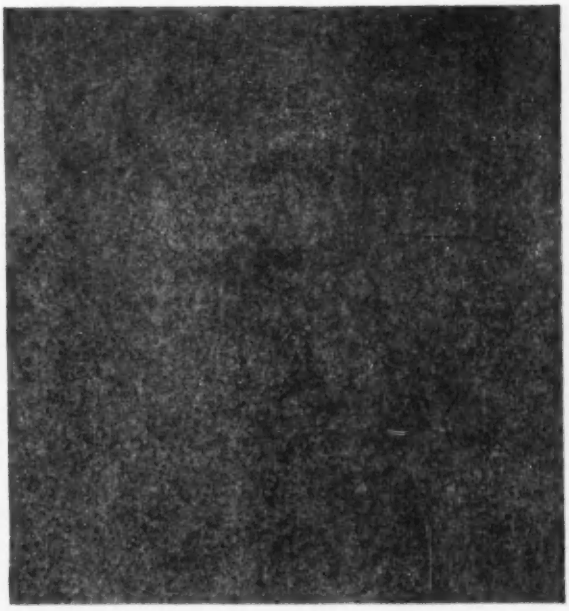
Hallidie Machinery Co., 2726 First Ave., South, Seattle, Wash. • REPRESENTATIVES IN ALL PRINCIPAL COUNTRIES



When plain carbon steel is exposed to the atmosphere, it begins to oxidize almost immediately and a layer of rust forms over the surface. After a brief period this rust has a tendency to curl up and flake off, leaving the metal exposed to further corrosive action.



Corrosion also takes place when Mayari R is exposed to the atmosphere. But the rust is different. Instead of flaking, it forms a thin, tight coating that holds securely to the surface and retards further corrosion of the metal beneath. And this in turn means longer life for Mayari R.

Why Mayari R Has Longer Life than Plain Carbon Steel

Tests conducted over a 10-year period show that Mayari R has 5 to 6 times as much resistance to atmospheric corrosion as plain carbon steel—and 2 to 4 times as much as copper-bearing steel.

During the first year of exposure under these tests, each of these three metals lost practically the same amount of weight through corrosion. But following that initial loss, the corrosion of the Mayari R gradually slowed down. After a few years it appeared to stop altogether. The plain carbon steel and the copper-bearing steel, on the other hand, continued to rust away and lose weight year after year, with practically no decrease in the rate of corrosion.

Mayari R has other advantages. It has better abrasion-resistance, higher yield point, and greater tensile strength than ordinary steel. These properties all contribute to improved design and longer life of equipment and structures.

You can get further information about Mayari R low-alloy, high-strength steel by writing to any of our sales offices for Catalog 259.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
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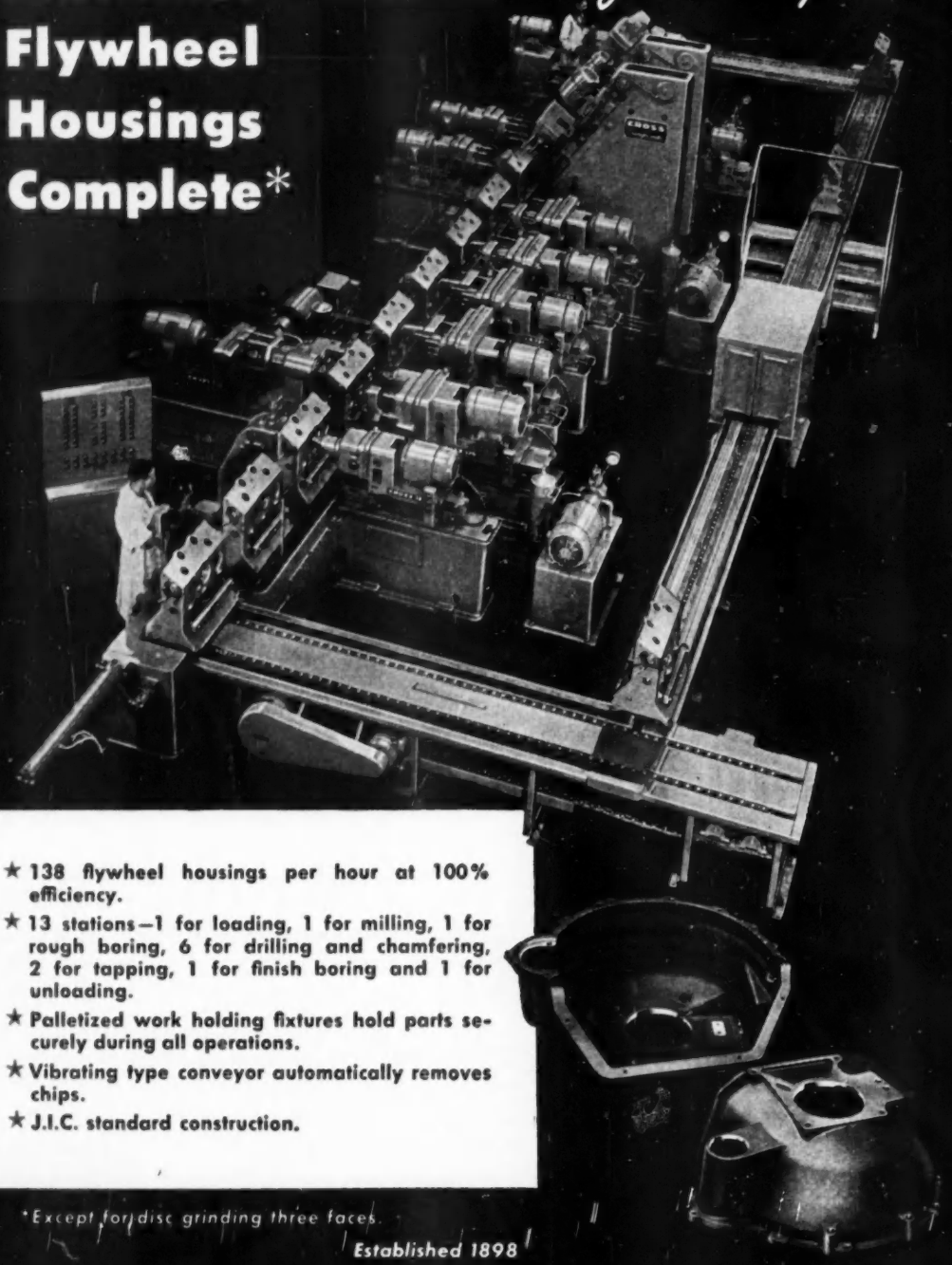
Mayari R *makes it lighter...stronger...longer lasting*

Machines Flywheel Housings Complete*

Another Transfer-matic by Cross



★ 138 flywheel housings per hour at 100% efficiency.

★ 13 stations—1 for loading, 1 for milling, 1 for rough boring, 6 for drilling and chamfering, 2 for tapping, 1 for finish boring and 1 for unloading.

★ Palletized work holding fixtures hold parts securely during all operations.

★ Vibrating type conveyor automatically removes chips.

★ J.I.C. standard construction.

*Except for disc grinding three faces.

Established 1898

THE CROSS CO.

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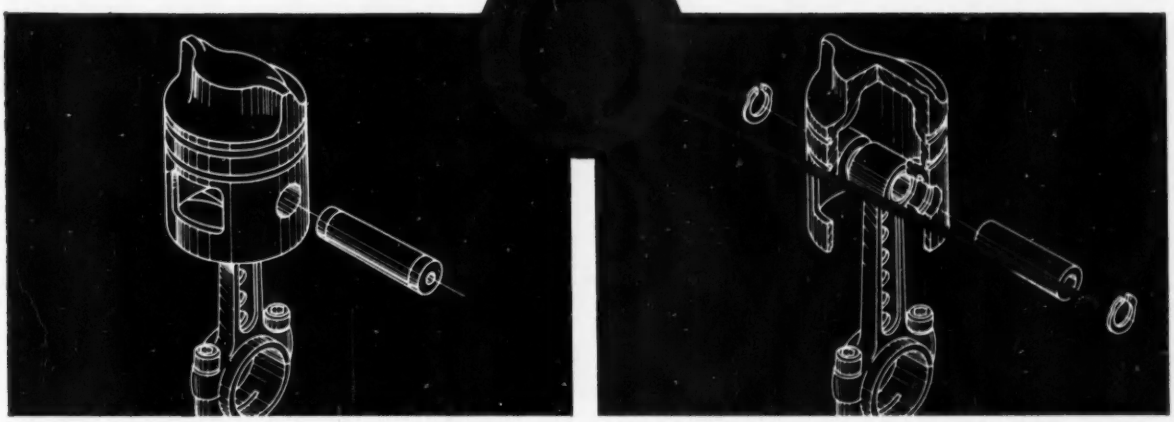
Special MACHINE TOOLS

2 Waldes Truarc Rings Replace 2 End Plugs ...Eliminate 3 Operations...Save $.066 Per Unit



OLD WAY Two inserted-plug type wrist pin locks hold wrist pin in place. 3 operations involved: costly machining, pressing in place, post-assembly machining. Costly maintenance problem—resulting from end plugs hammering loose.

TRUARC WAY Two Truarc Inverted Retaining Rings (Series 5008) hold wrist pin in place. Truarc Rings snap into grooves easily cut in piston, provide positive lock . . . practically eliminate maintenance costs. Quick assembly, disassembly.

Titan Chain Saws, Inc., Seattle, Washington, uses 2 Waldes Truarc Rings to replace old-style inserted-plug type wrist pin locks in their Titan chain saws. Use of Waldes Truarc Retaining Rings eliminates 2 press fit end plugs. Machining of plugs, pressing in place, finish machining—no longer required. Truarc way holds rejections to a minimum. Unit efficiency is greatly increased.

Redesign with Truarc Rings and you, too, will cut costs. Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better job of holding parts together.

Waldes Truarc Rings are precision-engineered . . . quick and easy to assemble and disassemble. Always circular to give a never-failing grip. They can be used over and over again.

Find out what Waldes Truarc Retaining Rings can do for you. Send your blueprints to Waldes Truarc engineers for individual attention, without obligation.

USE OF 2 WALDES TRUARC RINGS PERMITTED THESE SAVINGS PER UNIT:

OLD WAY	
Cost of 2 end plugs Cost of pressing in and machining	$ .169
TRUARC WAY	
Cost of grooving piston Cost of 2 Truarc Rings	.103
Saving per Unit	**$ .066**

For precision internal grooving and undercutting... Waldes Truarc Internal Grooving Tool.

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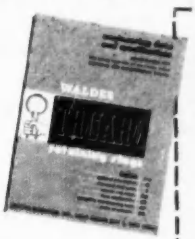
REG. U. S. PAT. OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS AND PLIERS ARE PROTECTED BY ONE OR MORE OF THE FOLLOWING U. S. PATENTS: 2,382,947; 2,382,948; 2,416,852; 2,420,921; 2,420,341; 2,439,785; 2,441,846; 2,455,165; 2,483,380; 2,483,383; 2,487,802; 2,487,803; 2,491,306; 2,509,081 AND OTHER PATENTS PENDING.



Waldes Kohinoor, Inc., 47-16 Austel Place, L. I. C. 1, N. Y.

Please send me the new Waldes Truarc Retaining Ring catalog.

(Please print) AY 015

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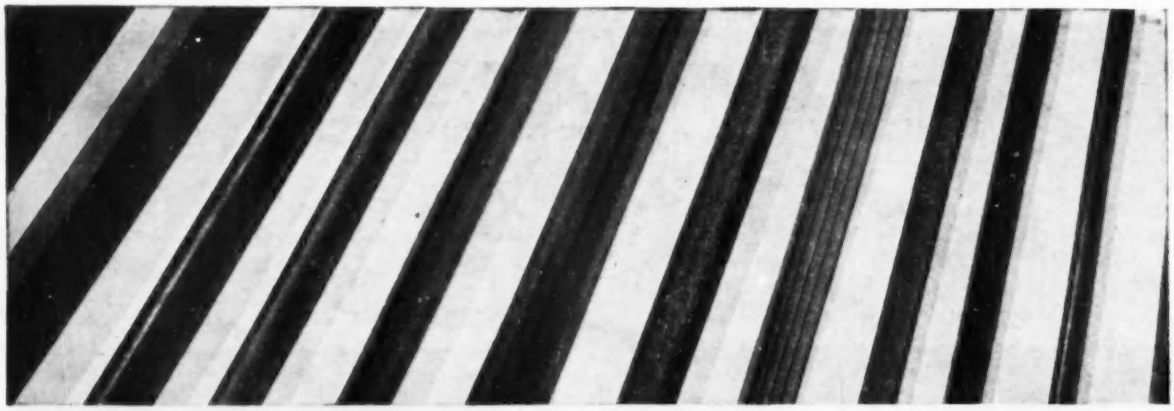
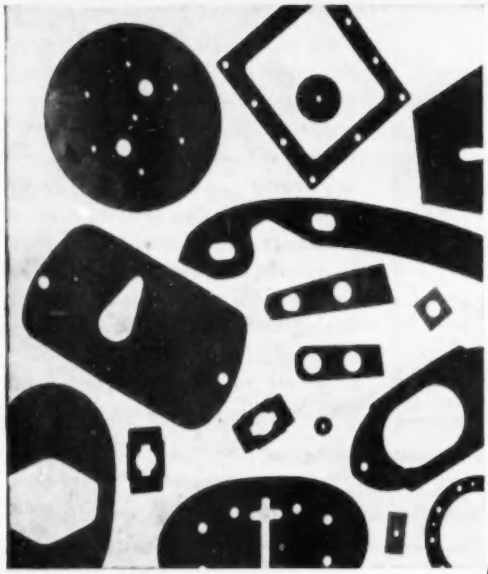
City ..... Zone ..... State .....



Unsurpassed *Synthetic* RUBBER COMPONENT PARTS



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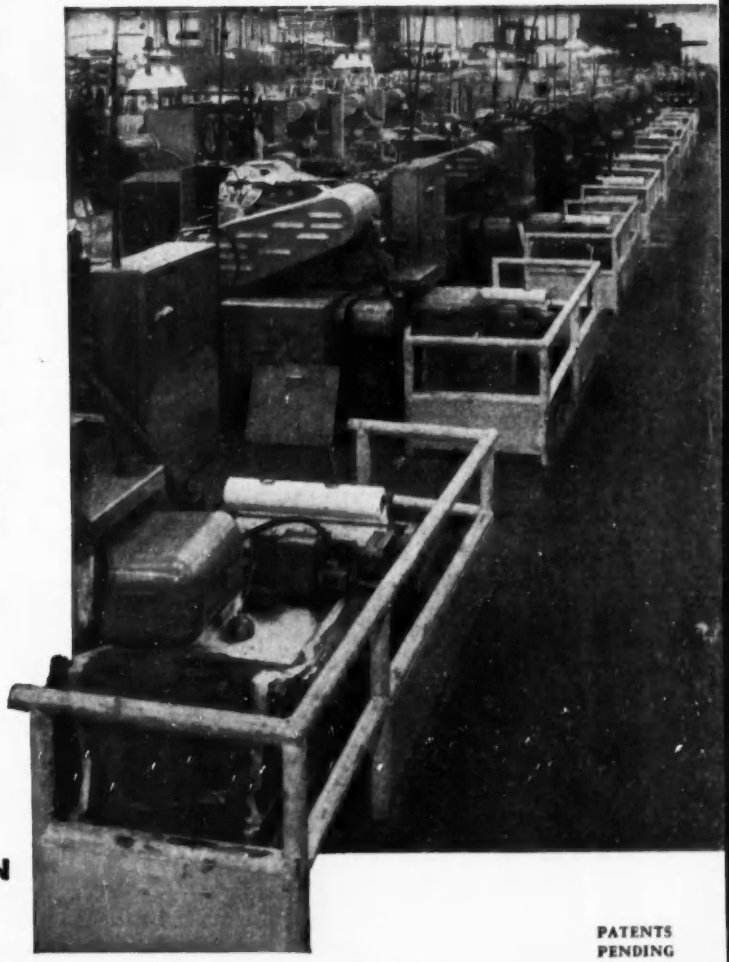

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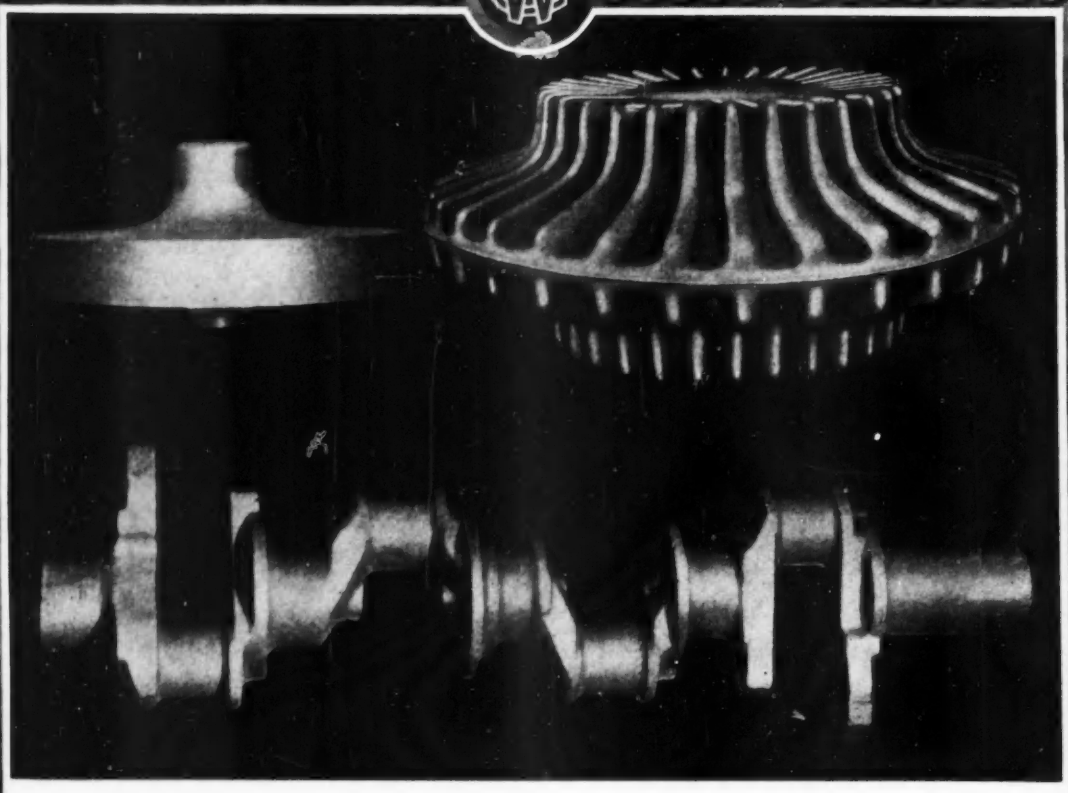

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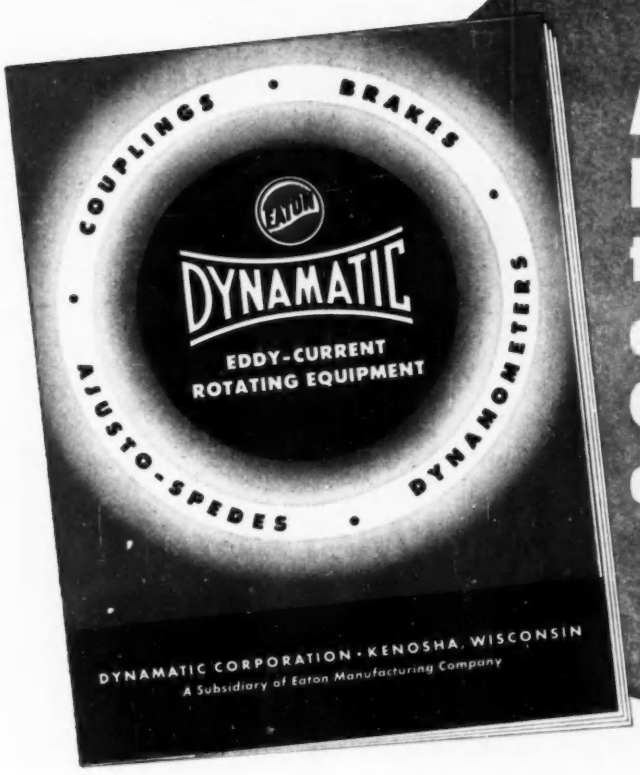

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. . . you can change resistance welding die set-ups in a matter of seconds . . .

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Die adaptor bases are custom designed to fit your machine specifications and a wide variety of standard electrode inserts are available from stock. Special shapes and sizes can be designed to fit any requirements. For complete data, either write us or call your Mallory distributor and ask for a copy of Technical Bulletin 8-22. It's just off the press.

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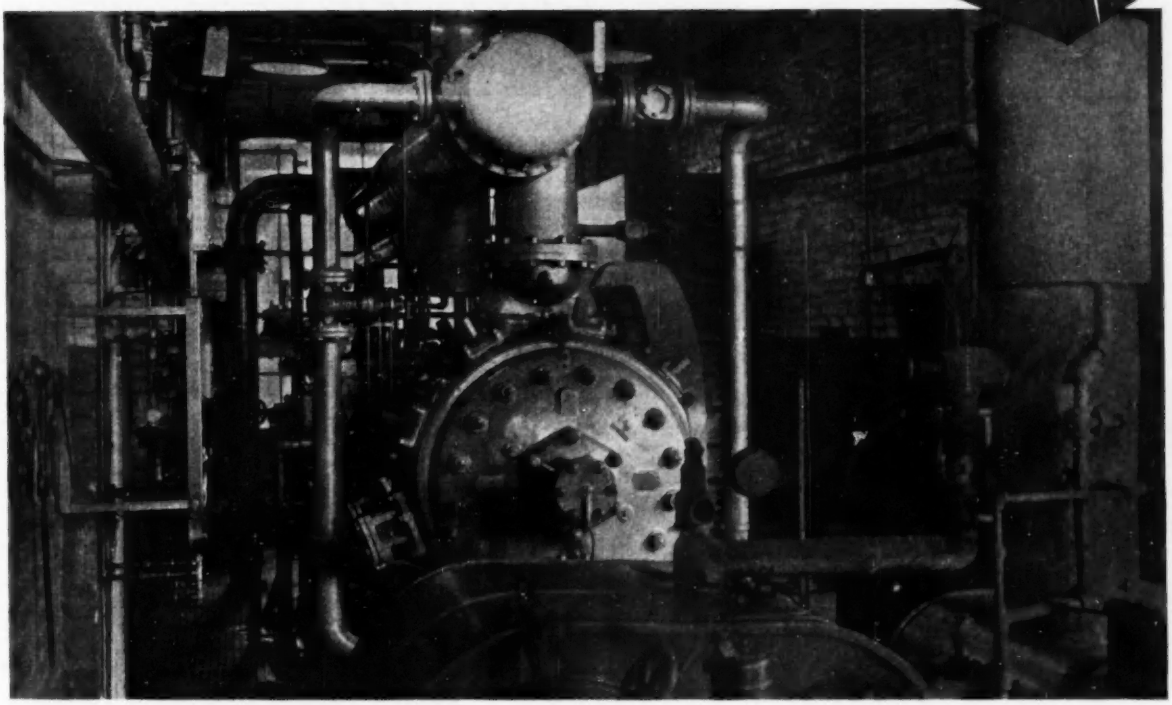
For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

Is available floor space holding back expansion of your plant air facilities?



Haven't got the floor space for additional plant air facilities? Don't be too sure!

How about the nooks and crannies, or right in among your machine tools? Other plants are squeezing Clark Balanced/Opposed Compressors in many such "impossible" places. The above illustration, in an aluminum forging plant, is a typical example. Here a 600 hp, 3200 cfm Clark unit was squeezed into a 20 x 13 ft. floor area.

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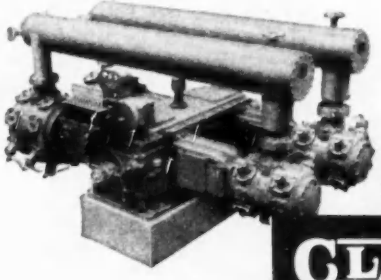
For full information on this modern, motor-driven compressor (150 - 4500 hp range), request Bulletin 118, or call your nearest Clark representative.



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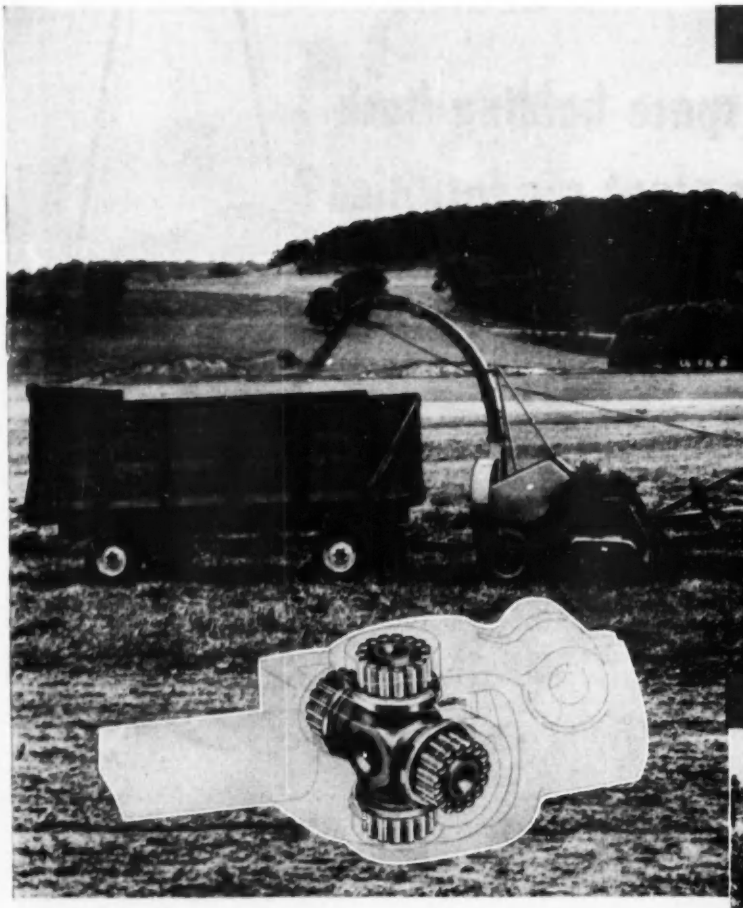

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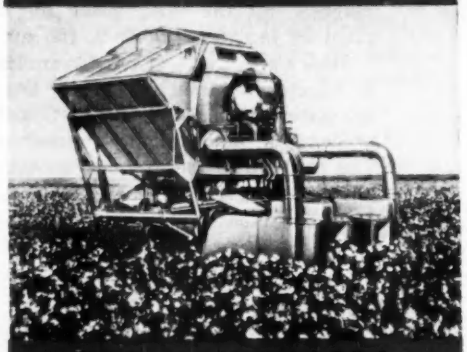

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it still goes!

A lot of things, including our name, have changed since this advertisement appeared in 1906. But aluminum automobile parts are *still* an Alcoa specialty.

See the latest

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Your R/M representative is a good man to know. He can work from samples, from designs on paper, or from figures on horsepower developed –combined with desired performance characteristics. With him you get the advantages offered by the world's largest maker of friction materials . . . with six great plants, their research departments, and their testing laboratories.

Woven and molded *asbestos parts are also included in R/M's complete line of friction materials . . . in the form of blocks, segments, discs, cones, collars and many special shapes.*

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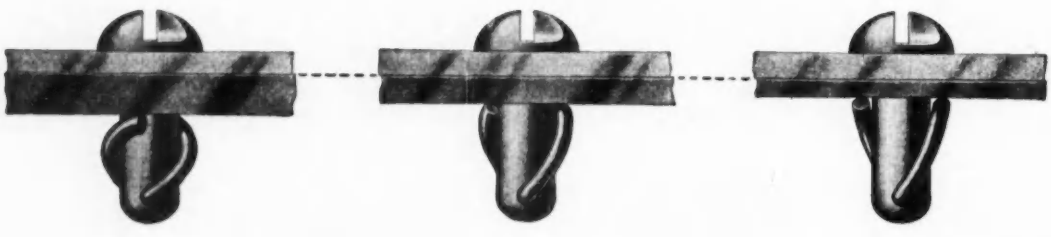
This fastener works through thick and thin!



Spring-Lock—the easy-to-use removable fastener for modern designs—works whether panel thicknesses run over or under specifications! Spring wire deflects automatically to handle greater or lesser thicknesses. Spring-Lock's design flexibility makes it more than a fastener: it can be adapted as a shelf support, door strike, knob or any similar panel-mounted device. Many standard shapes and sizes of Simmons Spring-Locks are available from stock.

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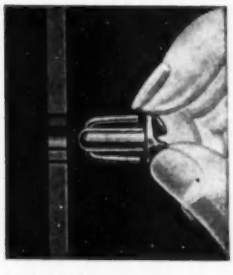
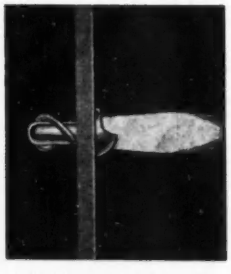
Spring-Lock · Quick-Lock · Roto-Lock

HERE'S HOW SPRING-LOCK WORKS



1. *Insert fastener.*



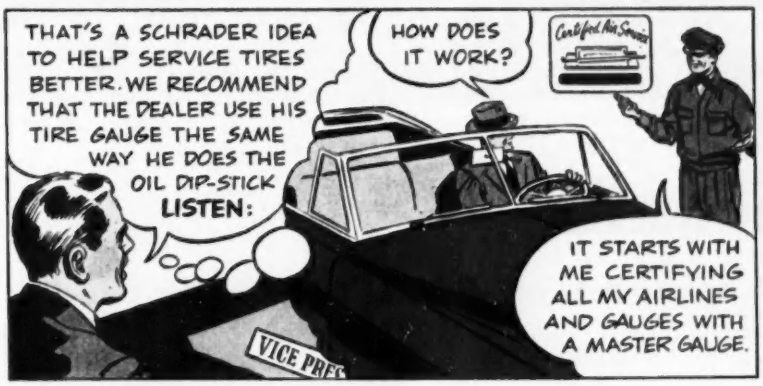
2. *Half-turn locks it in place.*

With production costs on the uptrend, you can figure on Spring-Lock as an assembly time and money-saver, because:

- **Installation is BLIND**
- **Installation is EASY: no special tools are needed**
- **Installation is QUICK: a half-turn locks it in place**
- **Installation is SECURE: the *spring* steel *locks* the fastener, resists vibration**

Send for details and samples, or write us about *your* fastening problem.

Schrader Contributions to the Tire Industry


THAT'S A SCHRADER IDEA TO HELP SERVICE TIRES BETTER. WE RECOMMEND THAT THE DEALER USE HIS TIRE GAUGE THE SAME WAY HE DOES THE OIL DIP-STICK LISTEN:
HOW DOES IT WORK?
IT STARTS WITH ME CERTIFYING ALL MY AIRLINES AND GAUGES WITH A MASTER GAUGE.
VICE PRES.

...I INFLATE TO RECOMMENDED PRESSURE APPLYING THE HEAT BUILD-UP FORMULA FOR SAFEST DRIVING, RIDING COMFORT AND STEERING EASE. THEN I SEAL IN THE AIR WITH THIS VALVE CAP.
IT SURE SOUNDS GOOD TO ME.
VICE PRESIDENT

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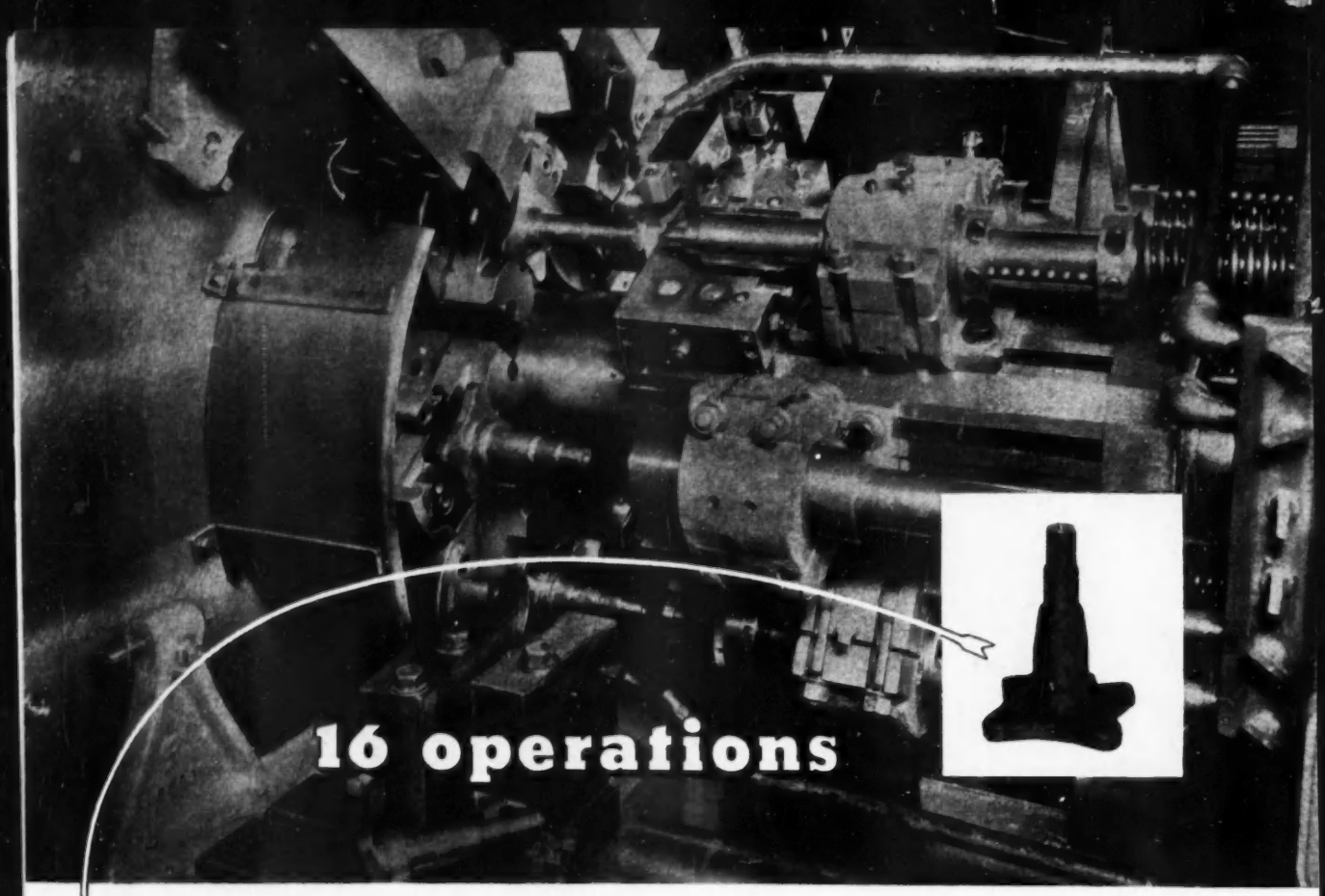
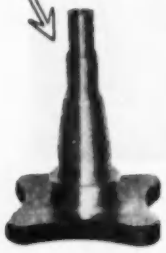


in 16 seconds

on an 8-inch, 6-spindle ACME-GRIDLEY Hydraulic Chucker



When Willys-Overland Motors, Toledo, O. changed methods to cut machining costs on larger production runs of this forged wheel spindle, they didn't buy the machine on general claims. *They bought guaranteed end results—16 operations in 16 seconds.*

They bought a carefully engineered plan of tooling for this particular job—with hydraulic centering loader, unique toolholder combinations for the 16 carbide insert tools, including 5 interrupted cuts on the flange face at 860 S.F.M.

There is another reason—Willys-Overland, like all other big automotive firms, has employed scores of Acme-Gridley Bar Automatics from 10 to 30 years. Based on this experience, it is logical that they seek our advice about advanced practices in tool engineering of Chucking Automatics.

For, no other source offers so much in design and tooling experience on bar and chucking automatics—more than 45,000 machines built.

For end results, cost savings, ask your engineers to contact ours.

JOB FACTS

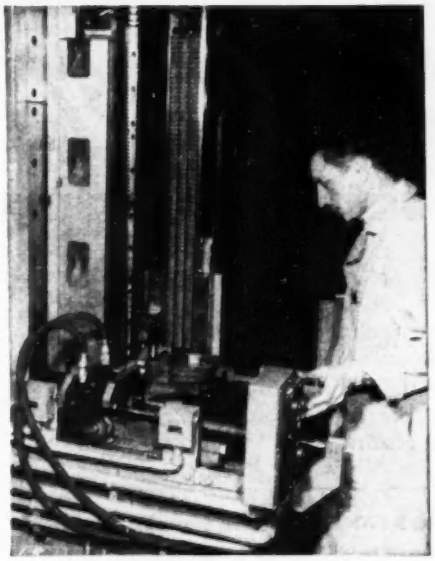
PART	**Front Wheel Spindle**
SIZE	**5¼" long, 4⅜" swing**
MATERIAL	**Steel forging, AISI-C1040**
OPERATIONS	**16, all with Carbide Tools**
MACHINE TIME	**16 seconds (225 per hr.)**

The NATIONAL ACME COMPANY

170 East 131st Street • Cleveland 8, Ohio.

ACME-GRIDLEY BAR AND CHUCKING AUTOMATICS (1-4-6 AND 8 SPINDLE) • HYDRAULIC THREAD ROLLING MACHINES • AUTOMATIC THREADING DIES AND TAPS • LIMIT, MOTOR STARTER AND CONTROL STATION SWITCHES • SOLENOIDS • CONTRACT MANUFACTURING

broached in a single pass . . . the AMERICAN way



Combining *two* operations on an American SB 48-15 Single Ram Vertical Hydraulic Surface Broaching Machine enabled this automotive engine manufacturer to broach the radius and pad (which are non-adjacent) of the front engine cover *in one pass.*

The tooling for this operation consists of generating type broaches and shaving blades mounted on the main machine slide for broaching the radius and joint surfaces. In addition, a special hardened and ground guide is mounted on the table to guide generating type broaches and shaving blades which are pulled down by adapting the lower end of the holder to the machine slide. These broach the pad thus completing the two operations in one pass.

Automatic clamping, plus an automatic sliding table are two additional features of this American installation that help maintain a production rate of approximately 115 parts per hour at 85% efficiency.

Write for your copy of American's Circular 300.

YOU CAN SOLVE YOUR BROACHING PROBLEMS THE AMERICAN WAY

This is only one of thousands of problems solved during American's 25 years of experience in the manufacture of broaching machines, broaches, and broaching fixtures. A part-print or sample and hourly requirements are all it takes to start American engineers working on your problem. Write today!

AMERICAN **American BROACH & MACHINE CO.**

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

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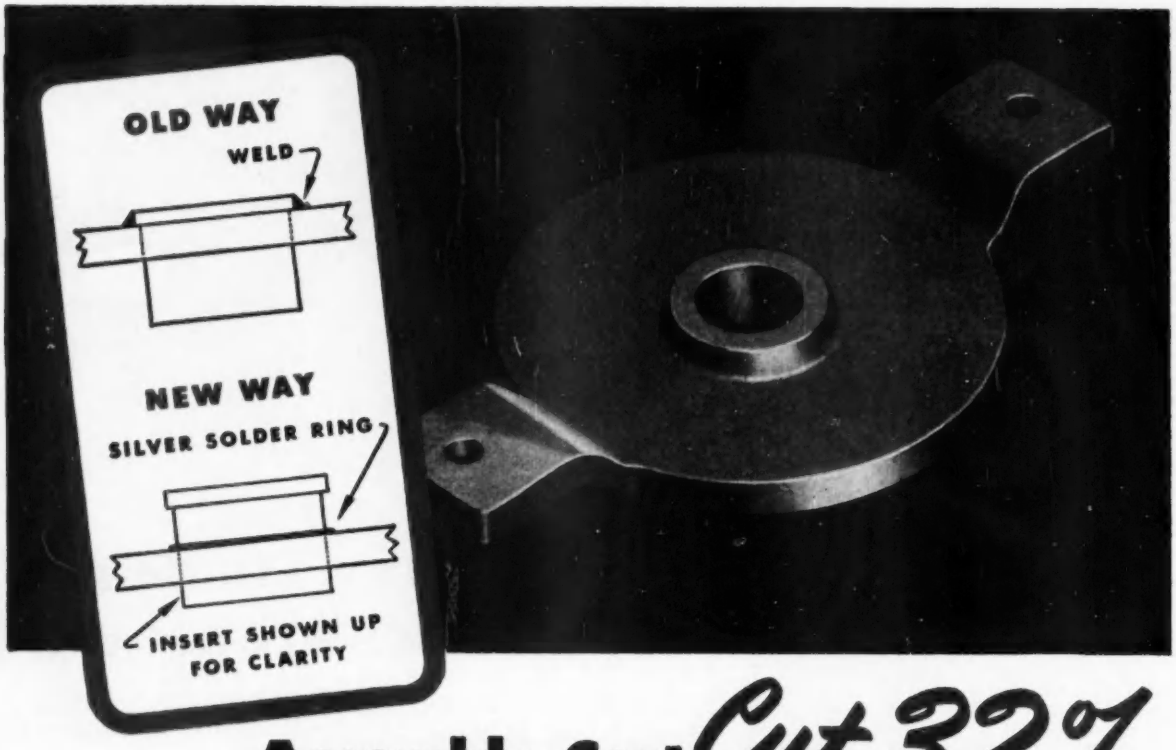
SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery



Assembly Cost *Cut 32%* with TOCCO* Induction Brazing

Now's the time to balance YOUR production budget

This assembly may bear no resemblance to your product, but its case is typical of the savings accomplished by Induction Heating of metal parts of all sizes and shapes.

Formerly the Norris Thermador Corporation used arc welding to join the bushing and clamp shown above. In an effort to reduce costs TOCCO Induction Heating was brought into the production picture with the following results:

OLD METHOD (Arc Welding)		**NEW METHOD** (TOCCO Induction Brazing)	
Material (rod)	$ 4.56 per M parts	Material (solder and flux)	$13.83 per M parts
Labor	20.63 per M parts	Labor	8.82 per M parts
Overhead	21.25 per M parts	Overhead	9.08 per M parts
Total Cost Old Method	$46.44 per M parts	Total Cost TOCCO Method	$31.73 per M parts

TOCCO Engineers are glad to survey your operations for similar cost-cutting results—no obligation, of course.

THE OHIO CRANKSHAFT COMPANY

TOCCO

Mail Coupon Today

NEW **FREE** BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. H-1, Cleveland 1, Ohio

Please send copy of "Typical Results of TOCCO Induction Brazing and Soldering."

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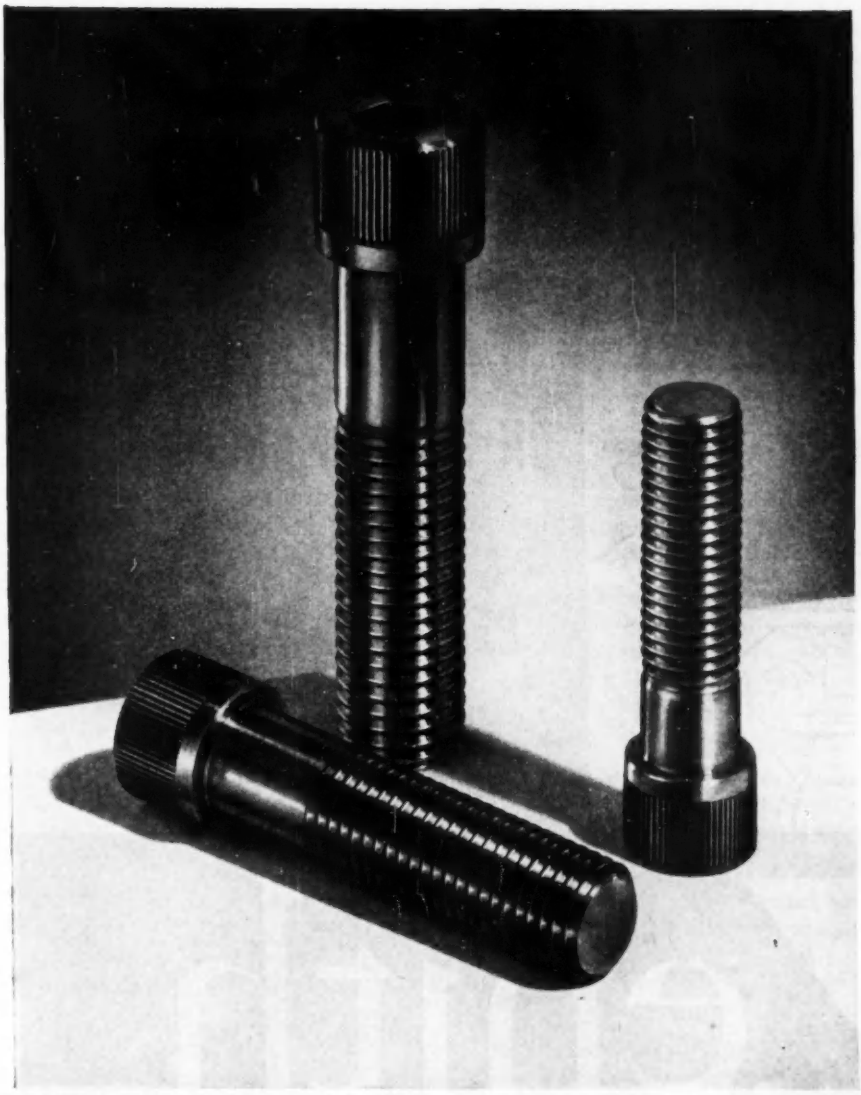
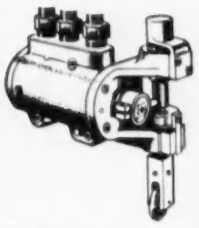
Our Fiftieth Year

A START FOR THE FUTURE

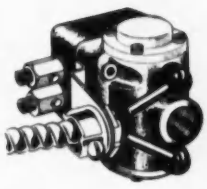


UNBRAKO SOCKET CAP SCREWS have knurled heads for sure grip, fast assembly; accurate hex sockets for positive, internal wrenching; fully formed threads, Class 3 fit.

Made of heat treated alloy steel, with controlled fillet and continuous grain flow, for strength; available in standard sizes from #4 to 1" in a full range of lengths.



USE UNBRAKO SOCKET CAP SCREWS for compact designs to save space, weight and material on machine tools and metalworking equipment.



On electrical and electronic devices, textile machinery and automotive equipment.

On precision instruments, dies, jigs and fixtures, and many other applications too numerous to mention.

Do you really need a special UNBRAKO screw?

Before you specify a special socket screw, check UNBRAKO Standards. A standard UNBRAKO will do the job as well in most cases—and much cheaper. You'll get better service and faster deliveries, because UNBRAKO socket screw products are stocked by your industrial distributor. Write for UNBRAKO Standards. SPS, Jenkintown 53, Pa.

Write for UNBRAKO Standards

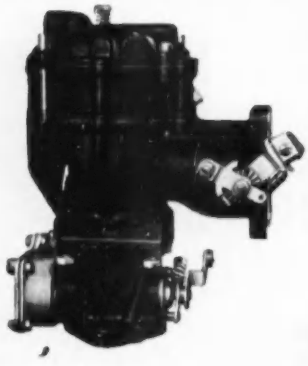
UNBRAKO® SOCKET SCREW DIVISION

SPS JENKINTOWN PENNSYLVANIA

Does He Knock or Boost Your Truck?

IT ALL DEPENDS ON PERFORMANCE and PERFORMANCE DEPENDS ON

Zenith CARBURETORS



What drivers and operators say about your vehicles has a mighty important bearing on the future of your business. So it is imperative that every component be selected on the basis of its contribution to lasting, satisfactory performance. In the field of heavy duty carburetion Zenith* has long been recognized as the engineer's choice for quality performance under all operating conditions. You can be sure that manufacturers whose vehicles are Zenith equipped measure carburetor costs in lasting terms rather than initial expense. Zenith's rugged construction, strong idling, freedom from stalling and obedient response to every power demand goes a long way toward building owner good will. That's why cost conscious operators and experienced drivers prefer Zenith equipped vehicles.

*REG. U.S. PAT. OFF.

ZENITH CARBURETOR DIVISION OF
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High Spots of This Issue

FIRST with the news of the 1953 Chevrolet and Buick is what we planned in delaying the mailing of this issue, which you should receive about the time of their public announcements.

★ **Modern Heat Treating of Axle Components**

Nearly a half-century of experience in axle manufacturing went into the planning of Timken-Detroit Axle Company's Newark, O., plant. The equipment and processes used to machine, heat, and assemble axle parts are described. Page 48.

★ **Buick's V-8 Engine and New Dynaflow for 1953**

A raft of new features, ranging from a V-8 overhead valve engine in the Series 50 and 70 to the Twin Turbine Dynaflow drive with a new torque converter, mark Buick's offerings for 1953. These and other developments are analyzed. Page 50.

★ **Higher Horsepower Chevrolets**

Main attractions in the Chevrolet parade for 1953 are a third series of cars, more powerful engines, restyled bodies, with a new Powerglide, power steering, and the Autronic Eye now optional equipment. Other details are given on Page 56.

★ **Accelerated Activity Ahead for The Aircraft Industry**

Both military and commercial requirements seem destined to push the tempo of aircraft production to an even higher peak in 1953. Admiral Ramsey forecasts what heights it may reach and outlines aviation achievements in 1952. Page 60.

★ **Propelled Fixtures Expedite Operations at Budd's Tank Plant**

Mechanization in its fullest sense has enabled Budd Co. to supply Chrysler's Delaware Tank Plant with a steady flow of hulls and turrets. The author conducts the reader on a tour of a truly unique plant layout and machine setup. See Page 66.

★ **29 New Product Items And Other High Spots, Such As:**

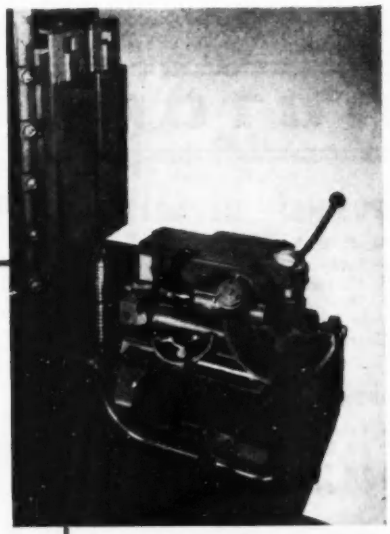
SHORTIES, a new first-of-the-month featurette, containing brief items of unusual interest, begins on Page 114; Ford golden jubilee tractor; cold extrusion savings in making rocket elements; Reo adopts hot spray painting; Chrysler proving grounds; automatic induction hardening of transmission shifter forks; and new loop-scavenged Diesel.

Automotive and Aviation News, Page 33
Complete Table of Contents, Page 3

Keeping the cost of BIG FAMILIES at a minimum

In the metalworking industry, big families of parts can eat profits out of house and home. Nevertheless, they can prove to be an asset if they're studied carefully from the viewpoint of reducing production costs. Cincinnati Application Engineers have been doing this for years with large and small quantities of similar parts that can be machined by the broaching process. Examples of their work are illustrated here. Do they suggest new ideas for your shop? ¶ Perhaps you have a high-cost family of parts —those having similar machining operations. Let us know about them. And if you would like to have more data on CINCINNATI Hydro-Broach Machines, refer to Sweet's Catalog File for Mechanical Industries, or write to us for publications M-1709-1 and M-1745.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

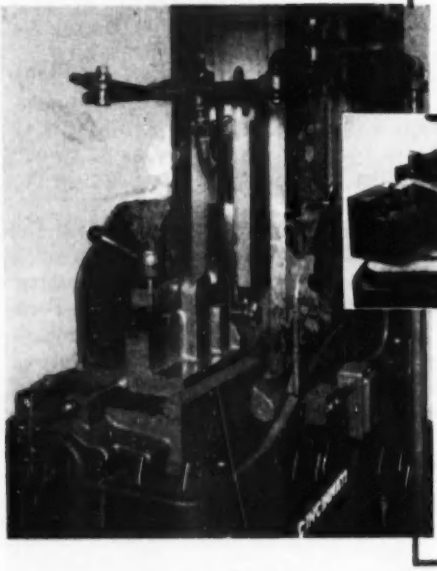


FAMILY OF 90 CAMS

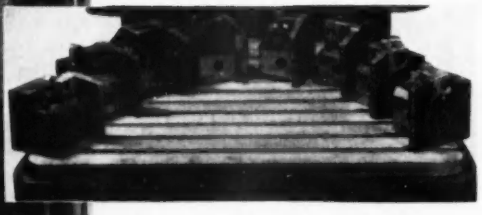
Part name ..... Cams (90 sizes and shapes)
Material ..... Cast iron
Operation ..... Broach half bore and parting face
Production ..... 140 per hour
Equipment ..... CINCINNATI No. 5-54 Single Ram Vertical Hydro Broach completely equipped to broach 90 sizes and shapes of cams

FOUR IN THIS ONE

Part name ..... Housings
Material ..... Cast iron
Operation ..... Broach feet
Production ..... 130 per hour
Equipment ..... CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach Machine, tooled up with broach inserts (cutters) and a fixture having interchangeable locating elements



EIGHT MEMBERS IN THIS FAMILY



Part name ..... Terminal studs (8 sizes and shapes)
Material ..... Copper
Operation ..... Straddle broach sides
Production ..... 125 per hour
Equipment ..... CINCINNATI No. 5-54 Single Ram Vertical Hydro-Broach Machine, tooled up with broach inserts (cutters), fixture and interchangeable fixture elements

Write for this folder—How to Step Up Production with CINCINNATI HYDRO-BROACH MACHINES — publication No. M-1599-1.

CINCINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 108, No. 1 **January 1, 1953**

Ford Terms Earnings Report as "Guess"

A big question in the industry is just how close the *Wall Street Journal* came to exact figures when it expressed for the first time in its Dec. 11 issue earnings of Ford Motor Co. for the years 1947 through 1951.

Traditionally, the paper has had an excellent reputation for responsibility and accuracy, and according to its report Ford last year had sales of $2952 million and earnings after taxes of $87 million, making it second only to General Motors Corp. in the industry. The *Journal* says, further, that earnings represented 11.2 cents for each dollar of sales before taxes, compared with 19.9 cents per dollar for General Motors, and 5.9 cents for Chrysler.

The figures on Ford earnings were challenged by Henry Ford II, who called them "figure guesses." He said that some 33 figure guesses were made, of which not one was correct. He confirmed, however, that Ford is the second largest enterprise in the industry. On the other hand, he flatly denied that possible future sale of Ford stock to the public is being considered.

Mr. Ford also commented that the story printed by the *Journal* obviously was the result of calculations based on published financial figures filed with the Mass. Commissioner of Taxation, as required by law, and certain financial data filed in Washington by the Ford Foundation under federal law.

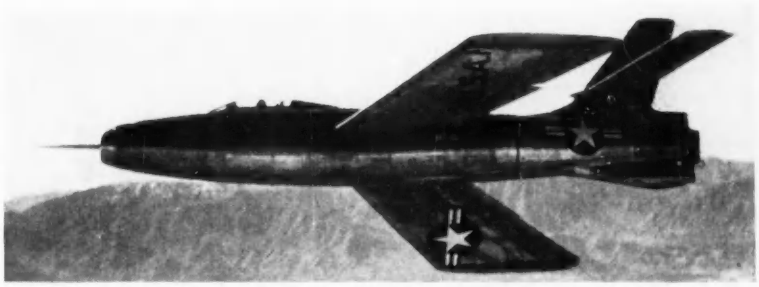
Journal Rebuts

In rebuttal, the *Wall Street Journal* expressed complete confidence in the accuracy of all its statistics used in connection with the story and said it does not engage in guess work and did not do so in this case. It also pointed out that round figures were used throughout the story for simplification. Observers point out that, as a result, Ford technically could be correct in stating the figures were not accurate, but at the same time the *Journal*, in the main, could be very close to the truth. In fact, Mr. Ford said that the company did not care at the time to comment on exactly how accurate or inaccurate any of the figures in the article might be.

In general, the article was very favorable to Ford, pointing out that it is the fourth largest company in the country in volume of business, ranking only behind General Motors, Standard Oil of N. J., and U. S. Steel.

The reported $87 million net earnings last year, after taxes, were a sharp drop from the $279 million the *Journal* reports the company made in 1950. Earnings reported for previous years are as follows:—1949, $203 million; 1948, $119 million; and 1947, $78 million.

The *Journal* reports that repair and maintenance of Ford properties last year cost $99.5 million; local taxes, $174 million; depreciation, $37.7 million; and pensions and profit-sharing contributions, $36 million. It also reported valuation of plants and properties at $713 million.



FASTER THAN SOUND

The XF-91 interceptor is the first American combat-ready airplane to use rocket power in flying faster than sound, according to Republic Aviation Corp. Main power is provided by a General Electric J-47 jet engine with afterburner, and boost power is from a Reaction Motors rocket of 6000 lb thrust. Variable incidence wing has inverse chord taper to reduce wing tip stall at low flight speeds. Tricycle landing gear has tandem rear wheels.

Pontiac Price Indicates GM Hold-Line Policy

With the announcement by Pontiac that none of its 1953 models will carry a price increase, it is apparent that General Motors Corp. policy on prices will be to hold the line. In fact, Pontiac reduced prices from $28 to $109 on station wagons. Since price policy is set by the corporation rather than the divisions, it is apparent that GM is going along with other companies of the industry that so far have announced prices.

Ford Motor Co. already has said that it plans no price increases on its three lines of cars. Hudson also is pricing its 1953 models the same as the 1952 line. Willys-Overland has actually cut prices on the two models it had in production this year by $88 and $185. It also is reducing the price of 4-door sedans which were announced last year but did not get into production during 1952. Willys prices now start at $1499.50 for the 1953 Aero Lark 2-door sedan which carried a 1952 price of $1557.50.

News of the AUTOMOTIVE

SPONSORED BY WILLYS

Although Willys-Overland Motors has no plans to produce a sports car, it will sponsor through its dealers this glass fiber bodied car built by Woodill Motor Co., a Willys dealer in Downey, Calif. Bodies are purchased from Glasspar and mounted on a custom frame. All chassis elements are standard Willys parts modified as required to fit the design. The 90-hp F-head engine is used, with a 135-hp version available. Wheelbase is 101 in. Standard price will be about $3260, with optional equipment extra including floor shift, overdrive, and removable canvas or fiber glass top.

Controls Relaxed on Second Quarter Output

Control officials last month gave the automobile industry virtually a free hand in the way of unit production beginning with second quarter, but warned that the automakers would have to find a lot of the needed steel, copper, and aluminum for themselves.

Specifically, NPA said it could permit second-quarter production on a basis of 1.5 million passenger cars and 315,000 trucks. NPA administrator Richard McDonald added, however, that the industry could count itself lucky if NPA could issue enough CMP tickets for steel and copper with which, added to conversion and imported steel supplies, to bring output up to 1.25 million passenger car units. Although NPA looks for production of more than two million tons in additional steel during the second quarter, the agency still takes a dim view of the over-all supply.

First quarter production was given a boost late in December when NPA granted the industry a second bonus allotment of steel, amounting to 353,000 tons of carbon sheet and strip. Total is still not enough for the 1.25 million units authorized.

Enough copper will be available, as NPA sees it now, to match whatever production steel supplies will permit. Officials concede that should price controls die as of Apr. 30, the effect on both scrap and refined copper would be such as to warrant some relaxation of controls on copper distribution.

Aluminum might easily be the controlling factor. Production losses are continuing because of lack of electric power. These losses currently are estimated at 120 million lb for the first quarter and about 70 million lb for the second.

New BLS Index May Bring Labor Talks

The industry is looking for some difficulty with labor this month after the Bureau of Labor Statistics announces first findings with its revised consumer price index. Reports say that labor leaders are not too pleased with the new index, which not only includes many items not previously taken into account, but also uses a different base in computing comparative prices.

About 75 items not formerly used in computing price changes have been added, and food, which previously made up about one-third of the index, has been relegated to less than 30 per cent. Also, for the first time prices in small and medium size communities will be included in the tabulations. Prices for 1953 will be related to those in the 1947-1949 period to show relative changes rather than the 1935-1939 period previously used.

BLS has recognized that changeover to the new index will create problems between unions and management which use it in computing wages and has drawn up several suggested methods for converting from the old to the new system. Unions are expected to ask for renegotiation of cost-of-living clauses.

Ordnance Cuts Peak Schedules For Tanks and Trucks

As a result of readjustment of forward production schedules for tanks and military trucks, output beginning next July 1 will start to slow down, according to an Army Ordnance announcement.

By early 1954 medium tank production will be running at about 75 per cent of the formerly planned peak production rate and actual production will be about 13.5 per cent of the nation's in-place medium tank capacity.

A point not generally made clear in the initial announcement is that the slow-down program will not have any immediate effect for most producers because it involves primarily a reduction in the peak output that had been planned and few, if any, companies are anywhere near that level. Consequently, the effect on employment will be negligible, since it will be some months yet before most companies are anywhere near the peak contemplated under the revised totals.

Here, in detail, is how various companies are affected: The Ford tank plant at Livonia, Mich., just west of Detroit, will continue in production of the M-48 during next year and will phase out about the end of the year. American Locomotive's tank plant in Schenectady, N. Y., will build out its schedule of the M-47 medium tank by the end of next year

(*Turn to page* 142, *please*)

AND AVIATION INDUSTRIES

Chrysler Corp. Boosts 13 In Engineering Div.

Appointment of seven executive engineers and six chief engineers in Chrysler Corp's Engineering Div. was announced last month by James C. Zeder, vice-president of the corporation and director of engineering and research.

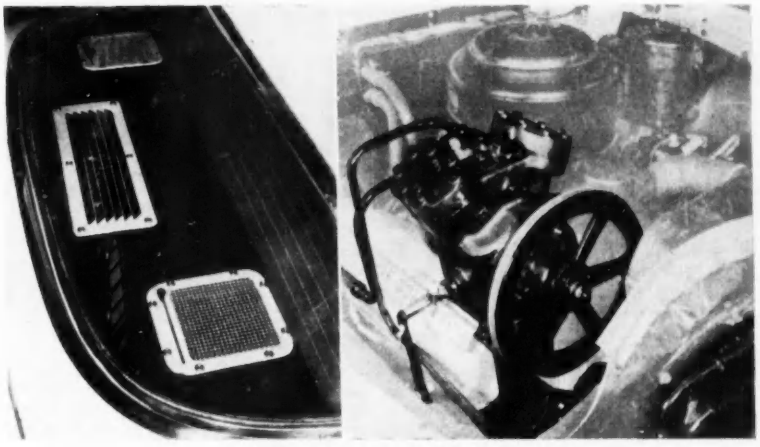
The new executive engineers, all formerly chief engineers of their respective sections, are P. C. Ackerman, laboratories; A. B. Couture, experimental; A. G. Herreshoff, development design; P. J. Kent, electrical; E. P. Lamb, truck engineering; F. W. Slack, chassis design, and U. L. Thomas, body engineering.

The six former assistant chief engineers, who now become chief engineers, are H. E. Chesebrough, body engineering; A. G. Loofbourrow, chassis design; I. C. McKechnie, electrical; Karl Pfeiffer, laboratories; S. J. Tompkins, truck engineering, and C. C. Utz, ordnance.

Mr. Zeder pointed out that the Engineering Div. has increased its personnel from 2163 in 1945 to more than 3300 today and the floor space of its operations from 540,000 to 675,000 sq ft in the same period. In addition, he said, the company is constructing the industry's largest automobile and truck proving grounds, near Chelsea, Mich.

Borg-Warner Names New Division Head

Borg-Warner Corp. has announced personnel changes affecting top management of two divisions. Arch A. Warner has been named president and general manager of Mechanics Universal Joint Div. to succeed G. C. Gridley, who has retired but will be retained in a consultative capacity. Warner previously was president and general manager of the Rockford Clutch Div. and has been succeeded by Harry L. Emerson, formerly vice president in charge of manufacturing. The company also announced promotion of G. L. Christianson to executive vice president of Rockford Clutch from his previous post as vice president and assistant general manager of the division.



CHRYSLER'S CONDITIONER

A four-cyl compressor drives the Chrysler Airtemp air conditioning system. Compressor and condenser are shown mounted on a DeSoto. The system, rated at three tons per day, mixes in 25 per cent fresh air through grills above the rear fenders, and circulates air into the passenger compartment through a cool air outlet and two warm air return grilles behind the rear seat. Cooling coils, fans, and air ducts are housed in a single unit in the rear deck.

Live TV Demonstration Will Highlight SAE Meeting

Eight panels and symposiums covering such subjects as titanium and fiber glass will be features of the SAE 1953 Annual Meeting at Detroit this month. A live television showing of the new laboratory of Timken-Detroit Axle Co. will mark the first time such a presentation is used at a national engineering convention.

Registration will begin Monday morning, Jan. 12, at the Sheraton-Cadillac Hotel, where daily technical sessions will be held throughout the week. The television show will be seen at the Rackham Memorial at 8:00 p.m. Jan. 12. Adm. Ben Moreell, board chairman of the Jones and Laughlin Steel Corp., will speak on "The Limits to Engineering" at the annual dinner Jan. 14 which begins at 6:30 p.m. at the Masonic Temple. The engineering display will feature exhibits by 50 manufacturers.

Crosley Holders Approve Recapitalization Plan

Stockholders of Crosley Motors, Inc. have approved a recapitalization program. It is understood that it will include increasing par value of present common shares from $6 to $10, exchange of one share of the new $10 par stock for each 20 shares of old stock; refunding of a debt of more than $3 million to Powell Crosley, Jr., and elimination of the deficit of more than $3.4 million in the earned surplus account to be charged to capital surplus. Major control of the company passed to General Tire and Rubber Co. last July.

Jacobs Control Changes

Control of the F. L. Jacobs Co., automobile parts maker since 1913, has passed from the founding family to a stockholder's committee. At the annual meeting last month seven of nine seats on the board went to the new group. Neil A. Moore, president since Nov. 1, and Clare S. Jacobs were elected from the management slate.

Moore outlined improvements that were needed at the Danville, Ill., and Traverse City, Mich., plants, and said the company should enjoy annual sales of $24-25 million. The company reported a net loss of about $69,000 in the quarter ended Oct. 1, on sales of $5.7 million.

News of the AUTOMOTIVE

WILLYS AERO FOUR-DOOR

The Willys Aero Lark, lowest priced of three models of the new four-door body, is powered with the L-head six-cyl engine. A new assembly line will be set up this year to double capacity to 400 cars per shift. Engine building capacity will also be increased. Plans call for over 100,000 passenger cars this year compared to about one-fourth that many in 1952.

Cadillac, B-O-P, Moraine to Increase Capacity

Cadillac Motor Div. of General Motors Corp. is planning a 25 per cent increase in production capacity over the next two years. The company, however, has not yet revealed details of steps to be taken to boost output capacity to 125,000 cars a year on a 40 hour week, from 97,000 this year. On a six-day work week, production would be 150,000 cars annually. Output for next year is scheduled at 112,500 units.

A large rebuilding and renovating program at its B-O-P plant at Kansas City, Kan., is being undertaken by General Motors Corp. In order to meet expanding needs of both automotive and aircraft production, seven new buildings will be put up. The runway at the airport adjoining the plant will be extended and new lighting facilities will be installed throughout the plant. A new power plant also is under construction.

Construction will begin soon on a new plant for Moraine Products Div. at Dayton, O. It will contain 180,000 sq ft of floor space and will be used as a technical and engineering center. The new unit will increase plant capacity by 25 per cent.

Plans for the construction of a West Coast automobile storage battery plant to be built in Anaheim, Calif., were announced by Delco-Remy Div. of General Motors Corp. Construction of the new plant will begin as soon as NPA approval has been received and contracts let.

The Charles F. Kettering Foundation announced plans recently to build a central research office and laboratory building. Located in Yellow Springs, O., the project will be devoted to research in solar energy conversion and photosynthesis.

Alcoa to Get Large Forging Presses

In connection with the heavy press program, officials of the U. S. Air Force and the Aluminum Co. of America announced the completion of negotiations on a contract that will bring two of the largest forging presses in the world to Alcoa's Cleveland, Ohio, plant.

The presses of 35,000 and 50,000 ton capacity will be housed in a structure equivalent in height to a ten-story building. They are expected to be put in operation in 1954. The 50,000 ton press will have an overall height of 80 ft, 36 of this below ground level. The 35,000 ton press is 38 ft wide, 65 ft long and will tower 49 ft above the ground. Steel reinforced concrete foundations extending 30 ft underground will rest on pilings reaching 75 to 80 ft downward.

The presses will be operated by Alcoa in a Government-owned plant adjacent to the Cleveland works. Total cost will be about $40 million.

Mesta Machine Co. and the United Engineering Co. are constructing the presses.

Willys to Mark 50th Anniversary in 1953

Willys-Overland will observe its 50th anniversary this year and, accordingly, is calling its 1953 cars its "Golden Jubilee" models. The company dates back to Feb. 12, 1903, when the first Overland runabout was completed in a factory loft of the Standard Wheel Co. in Terre Haute, Ind. The old Overland Automobile Co. moved to Indianapolis in 1907 and finally to larger quarters in Toledo in 1912. The company had its largest year in 1928, when it produced 314,437 vehicles.

Plastic Die Uses Outlined by Maker

Following the recent announcement of the adoption of Rezolin press dies by Chrysler Corp., George C. Adams, Rezolin, Inc., presented a paper before Detroit Section SAE on Dec. 8 outlining some of the economic applications of Rezolin Tool-Plastic and describing the techniques for producing press die equipment for various purposes.

Since announcing the first production application several months ago, Rezolin has made a number of noteworthy installations in the Detroit area. Although it is too early to summarize figures on the life of plastic dies, it is significant that the original Chrysler equipment has produced some 21,000 pieces.

Adams mentioned that in addition to press dies for moderate production runs plastic die equipment can serve other equally important functions. For example, it can be used to complete a production run in the event of breakage or serious wear of conventional die equipment near the end of a seasonal run. Another major function is for making sheet metal parts where the original die has become worn out.

Plastic draw dies also are useful, Mr. Adams stated, in short run applications for prototype development work, or for making custom cars in small runs, or for show requirements for production models. In the motor truck field short run special models can be tooled economically without resorting to expensive steel dies.

AND AVIATION INDUSTRIES

European Utility Cars Announced to Boost Market

Renault has introduced a utility model of its rear-engine passenger car, bringing the price down to $999. The drop in price has been obtained by the elimination of all chromium plating and by using cheaper upholstery. The standard models, at respectively $1130 and $1198, are being continued.

By this move Renault gets very close to the four passenger Citroen with twin-cylinder air-cooled motor, listed at $855 on the French market. The Citroen was introduced as a utility vehicle to appeal primarily to the farm market, but its use has spread until it is one of the best sellers in France. Little attempt has been made to export it.

Market Shrinking

Renault's move has been made necessary by a shrinking market, which has caused a drop from a 48 to a 40 hr week. While new car registrations for the first nine months of the year were 283,157, or an increase of 37 per cent over 1951, there was a sharp drop in September, and this is certain to continue during the last three months of the year. A substantial reduction in exports has also affected French production lines.

After running light for the past six weeks, French Ford is just about to get into full production on the new Vedette 1953 model. Bodies for this are being produced in the Ford section of the Chausson Co., where seven Spiertz and Toledo presses are in operation and an eighth is being installed. The planned output is 85 cars per day, but the prospects are that this will shortly be increased.

Low-Priced Ferrari

An economical automobile has been produced by Ferrari, of Modena, Italy, and is expected to be put on the market in 1953. The new Ferrari has a two-cyl engine of 21.3 cu. in., claims 60 mpg and a maximum speed of 50 mph. Ferrari, specializing in racing and sports cars, has no facilities for big production, and arrangements are being made for building his car in an important engineering establishment in northern Italy.

LIGHT DIESEL

Diamond T's newest is the model 723, powered by the new Cummins JBS engine of 150 hp. Weight with fuel and fifth wheel is under 10,000 lb. Ross steering is used, and Eaton 18501 rear axle is standard, with dual axle available.

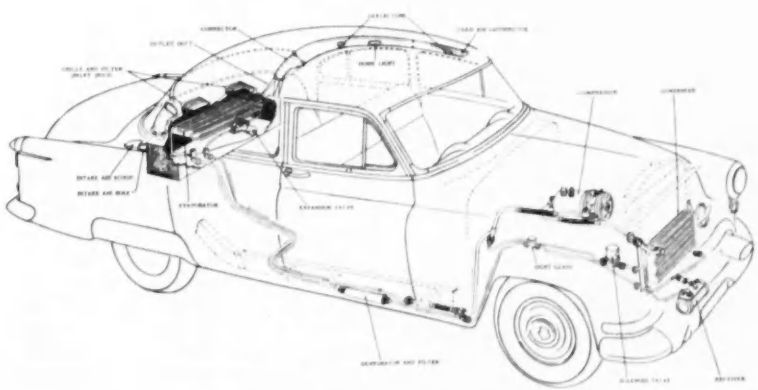
It is known that Fiat has been experimenting for a considerable time on an automobile of the same type as the Ferrari, but there are not yet any indications that this is about to be put into production.

Tiscornia Fund

Supervisory employees of Auto Specialties Co. honored president James W. Tiscornia, founder of the company, on his 67th birthday recently at a party held in St. Joseph, Mich. Employees presented him with a $4000 check to found the James W. Tiscornia Fund.

Tractor Power Steering

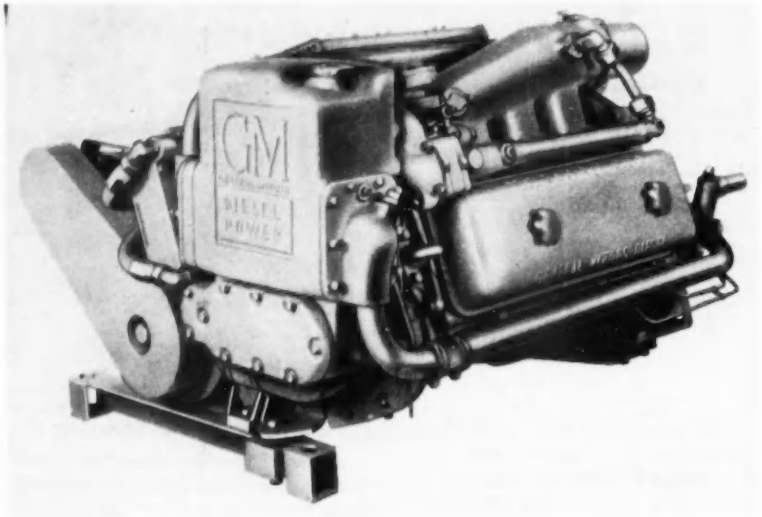
Behlen Manufacturing Co., Columbus, Neb., is marketing a hydraulic type power steering unit for tractors and other self-propelled farm equipment. The unit will sell for $180 plus installation. About three feet of the standard center steering shafte are removed and the Behlen unit on a new three-foot section of shaft is inserted. A hydraulic pump is fastened to the timing gear housing of the engine in the location the magneto or distributor assembly occupies. The magneto or distributor is fastened to a pad on the pump.



COOLING THE OLDSMOBILE

This diagram of the air conditioning system optional in the new Oldsmobile shows the layout of components and ducting. Plexiglass connectors in front of the rear window direct cool air through the ducts just below the headlining. The ducts are perforated along their length, and in addition have airplane-type deflectors. A preset thermostat in the return air stream is adjusted for 69-71 F, and relative humidity is in the range of 25 to 55 per cent. Intake scoops can bring in 60 cfm at 50 mph. The engine can idle for 30 min of 100 F air temperature. Rating at 50 mph is two tons.

News of the AUTOMOTIVE



INCLINED DIESEL

General Motors Corp. recently introduced its new inclined Series "71" four-cyl marine Diesel engine, which is 9½ in. lower than the conventional vertical engine. Through the extensive use of aluminum its weight was reduced 500 lb. With 80 mm injectors used for the first time in this series, the engine is rated at 138 hp at 2100 rpm.

Hyster to Open European Plant

Opening of a new plant in Europe for the manufacture of materials handling equipment has been announced by Hyster Co. The new firm, Hyster Europe, N. V., has been incorporated in Holland, and will build certain Hyster products for the European market.

The Hyster operation will occupy a new plant at Nijmegen, Holland, about June 1, 1953. In the interim manufacturing will be carried on at the American plant of Geveke & Co., Hyster-Caterpillar dealers, and in temporary quarters at Nijmegen. Frank Rostedt, comptroller and assistant secretary of Hyster, will be general manager of the new firm and P. C. Mallin'x of Amsterdam has joined the company as factory superintendent.

Convertible Aircraft Seen Practical in Near Future

The military services see the convertiplane as of great importance in the near future. This was revealed by speakers representing the Navy and the Air Force before the second Convertible Aircraft Congress at Philadelphia, Pa., on Dec. 12.

Though current projects are shrouded in secrecy, general statements made by military and industry speakers indicate that jet-powered airplanes capable of using helicopter-type blades for high speed forward flight are being investigated. Discussion brought out that helicopter tugs might some day lift conventional transports in and out of small areas.

M-F Will Make Holley Items

The Holley Carburetor Co. and the Mast-Foos Manufacturing Co. have completed an agreement authorizing Mast-Foos to manufacture and distribute carburetor and ignition parts which are no longer on Holley production schedules. These products were original equipment component parts for automobile, truck, stationary, industrial and marine engines. Kerosene vaporizers for tractors, and ignition parts for automobiles and trucks will also be available.

Mast-Foos specializes in providing parts and service for products that ordinarily would be difficult to obtain.

Nash 1952 Earnings Down 25 Per Cent

Earnings of Nash-Kelvinator Corp. dropped nearly 25 per cent in the fiscal year ended Sept. 30 from the same period a year ago. Profit for the year was $12.6 million compared with $16.2 million in the 1951 fiscal year. The company says that the drop in earnings was due primarily to government controls on production, prices, and installment credit, and to lost production because of the steel and other strikes.

GM New York Show to Open Jan. 17

General Motors Corp. will hold its automobile show at the Waldorf-Astoria Hotel in New York City Jan. 17-23. The show will be the first since 1950 and will be called the "GM Motorama of 1953." In addition to 1953 cars of all GM divisions, the show also will feature special research, engineering, and appliance exhibits, plus the two GM experimental cars—"Le Sabre" and "XP 300." In addition, trucks, aircraft products, marine and railway equipment and automatic or audience participation exhibits will be on display.

Engineers Cost More

Starting salaries for 1952 engineering graduates of New York U. averaged 9 per cent higher than those for 1951 graduates, with approximately three-fourths of the engineers entering the employ of private industry. An employment survey of last year's class revealed the average monthly starting salary in 1952 was $328, and the range went from $250 to $425.

NYU pointed out that the upward step continued a trend which in each of the last six years except 1949 has produced significant annual increases. Current starting salaries average 45 per cent higher than those of 1947.

Highest average salaries in 1952 were in the fields of aeronautical engineering, mechanical engineering, and industrial engineering, according to the survey. It was pointed out that fields with the highest average salaries vary from year to year.

AND AVIATION INDUSTRIES

Bendix Adds Fourth California Plant

Bendix Aviation Corp. has put its fourth North Hollywood, Calif., plant into operation. The new unit contains 60,000 sq ft of floor space and currently is devoted to production of electronic devices, including complex Sonar gear for the Navy. The plant also is equipped for large scale production of sheet metal products. Another feature of the new unit is a complete laboratory for research and development in miniaturized electronic parts.

National Lead May Merge With Doehler-Jarvis

Stockholders of Doehler - Jarvis Corp. will vote soon on a proposal made by directors for a merger with National Lead Co. Under the plan, all assets of Doehler-Jarvis would be exchanged for National Lead common stock on the basis of 1.15 National Lead shares for each share of Doehler-Jarvis common. Doehler - Jarvis is one of the largest producers of nonferrous metal die castings and also produces ornamental and general hardware.

Detroit Harvester Buys Clinton's Warner Div.

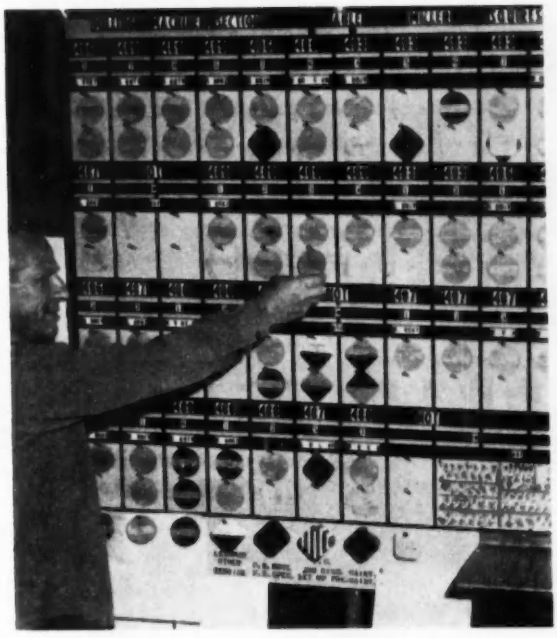
Detroit Harvester Co. has purchased the Warner Div. of Clinton Machine Co. at Detroit for more than $1 million. The 30,000 sq ft plant produces aircraft and hydraulic equipment under defense contracts and will have sales of about $4 million this year. It also has a defense backlog of about $4.7 million. All key personnel will be retained. The acquisition brings to seven the number of divisions of Detroit Harvester, which now has total plant space of about 530,000 sq ft.

GM to Build Engine for New Type Train

A Diesel locomotive for the revolutionary "Train X" which is being developed by Chesapeake and Ohio Railway will be designed and built by General Motors Corp. The new train is a lightweight unit with the floor only 18 in. above the rails compared with 51 in. for conventional cars. The C&O has been working on the train for about six years and so far has used a regular Diesel locomotive attached to the train through an adapter unit. GM will build the locomotive at its own expense. Exact horsepower has not yet been determined, but it is believed it will be about 1600 hp.

MILLING CONTROL

Greater efficiency at Lockheed Aircraft Corp. is the result of this board in the milling shop. Kaleidoscope-shaped tags in color pin-point the status of current and pending work orders, and eliminate manual filing system. Tags have reduced machine idle time.



1952 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Ten Months' Totals

MAKE	October 1952	September 1952	October 1951	TEN MONTHS Units 1952	Units 1951	Per Cent of Total 1952	Per Cent of Total 1951
Chevrolet	27,813	21,861	29,220	220,964	304,319	32.90	35.19
Ford	15,284	11,856	23,554	146,525	215,637	21.81	24.94
Dodge	9,180	8,909	9,655	86,473	90,676	12.87	10.49
International	8,728	8,861	11,247	79,426	81,497	11.82	9.42
G. M. C.	8,105	6,729	8,908	66,289	86,619	9.87	10.02
Studebaker	2,899	2,478	3,470	24,496	27,584	3.65	3.19
Willys Truck	1,244	1,034	1,574	9,562	13,096	1.42	1.51
White	1,030	878	1,132	9,326	10,590	1.39	1.22
Willys Jeep	777	671	799	6,863	7,488	1.02	.87
Mack	697	556	802	6,174	8,569	.92	.99
Diamond T	323	273	370	2,937	3,947	.44	.46
Reo	381	305	268	2,810	2,989	.42	.35
Divco	242	266	333	2,416	3,327	.36	.38
Brockway	171	142	175	1,390	1,933	.21	.22
Autocar	156	130	181	1,308	1,782	.19	.21
Federal	74	66	82	710	876	.11	.10
Kenworth	61	66	57	609	574	.09	.07
F. W. D.	73	26	66	443	418	.07	.05
Pontiac	46	36	117	425	756	.06	.09
Peterbilt	24	21	28	208	258	.03	.03
Sterling	29	8	26	205	293	.03	.03
Misc. Domestic	135	188	116	1,890	1,282	.28	.15
Misc. Foreign	14	17	21	250	215	.04	.02
Total—All Makes	77,486	65,381	92,281	671,719	864,737	100.00	100.00

* Based on data from R. L. Polk & Co.

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Bankers Predict Higher Car Depreciation Rate

Automobile finance men are looking for more rapid depreciation and a higher repossession rate next year. At a meeting of bankers in Chicago, one speaker said that the depreciation rate next year probably will be higher than at any time during the last 10 years because of high production and a competitive market. He said such a condition has not prevailed through most of the period since 1940. He also predicted that dealer inventories of cars will be the highest in history by the end of February, requiring drastic changes in merchandising and financing of cars.

Dow Workers Respond To Stock Offering

Dow Chemical Co. reports that 44 per cent of its 22,300 employees eligible to subscribe for stock in the company took advantage of the opportunity. Approximately 9800 employees, a record number, subscribed for approximately 150,000 shares of Dow common stock under the fifth annual employee stock purchase plan. Employees were eligible to subscribe to stock totalling not more than 10 per cent of their annual wage or salary, with payments made through payroll deductions at least until next Apr. 6, after which the balance may be paid in a lump sum if desired.

Ten Months' Retail Car Sales Valued at $7,116,000,000*

Price Group	October 1952 Sales Units	% of Total	Dollar Volume Dollars	% of Total	Ten Months 1952 Sales Units	% of Total	Dollar Volume Dollars	% of Total
Under $2,000	211,639	55.62	$373,871,904	46.92	1,766,154	52.37	$3,120,006,409	43.84
$2,001 to $2,500	103,424	27.18	230,438,409	28.92	1,008,146	29.89	2,235,778,698	31.42
$2,501 to $3,500	48,847	12.84	131,114,545	16.46	446,496	13.24	1,204,396,555	16.92
Over $3,500	16,608	4.36	61,338,647	7.70	151,681	4.50	556,537,614	7.82
Total	380,518	100.00	$796,763,505	100.00	3,372,479	100.00	$7,116,719,276	100.00

*—Calculated on basis of new car registrations, as reported by R. L. Polk & Co., in conjunction with advertised delivered price at factory of four door sedan or equivalent model. Does not include transportation charges or extra equipment.
†—New registrations of American made cars only. Does not include imported foreign cars.

1952 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1952 Ten Months' Totals

MAKE	October 1952	September 1952	October 1951	TEN MONTHS Units 1952	Units 1951	Per Cent of Total 1952	Per Cent of Total 1951
Chevrolet	88,811	69,938	77,377	694,791	933,159	20.41	21.10
Ford	79,037	59,503	61,494	578,361	750,372	17.02	16.98
Plymouth	31,639	29,717	35,961	356,868	485,623	10.50	10.99
Buick	30,753	25,216	28,106	257,716	340,664	7.58	7.71
Pontiac	27,114	21,408	24,525	219,796	292,095	6.47	6.61
Dodge	16,650	15,270	23,560	203,464	261,017	5.99	5.91
Oldsmobile	21,802	17,400	19,396	180,514	238,188	5.31	5.39
Mercury	15,620	13,698	16,994	145,063	201,540	4.27	4.56
Studebaker	12,045	8,440	16,902	129,377	178,224	3.81	4.03
Nash	12,494	9,869	13,557	118,197	119,531	3.48	2.71
Chrysler	5,710	7,757	9,962	93,622	132,389	2.76	3.00
Cadillac	9,043	8,854	8,459	75,368	83,485	2.22	1.89
De Soto	6,787	6,157	8,907	74,620	96,597	2.20	2.19
Hudson	6,255	6,675	7,111	67,981	85,358	2.00	1.93
Packard	4,824	4,296	5,515	56,401	57,905	1.66	1.31
Kaiser	3,494	3,219	3,715	33,862	46,355	1.00	1.05
Willys	3,648	3,631	2,286	33,741	23,183	.99	.52
Henry J	1,430	1,696	3,591	25,035	45,867	.74	1.04
Lincoln	3,266	2,775	2,275	24,010	22,421	.71	.51
MG (British)	687	726		6,383		.19	
Austin (British)	322	555	405	4,263	3,027	.13	.07
Hillman (British)	485	530		4,034		.12	
Ford (British)	426	284	435	3,125	2,962	.09	.07
Jaguar (British)	357	338		2,644		.08	
Crosley	65	139	390	2,598	4,746	.08	.11
All State	114	181		1,365		.04	
Misc. Domestic	27	13	719	924	2,685	.03	.06
Misc. Foreign	500	563	1,480	4,109	11,347	.12	.26
Total—All Makes	383,385	318,870	373,162	3,398,232	4,418,720	100.00	100.00

* Based on data from R. L. Polk & Co.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	October 1952	September 1952	October 1951	Ten Months 1952	Ten Months 1951	Per Cent Change Oct. over September	Oct. over Oct. 1951	Ten Months 1952 over 1951
1	New England	22,243	19,093	20,972	196,401	252,797	+16.50	+ 6.06	−22.31
2	Middle Atlantic	69,748	56,589	66,918	641,022	845,897	+19.05	+ 4.23	−24.22
3	South Atlantic	45,247	37,407	46,943	401,693	522,685	+20.96	− 1.51	−23.15
4	East North Central	94,256	80,454	97,672	867,494	1,140,359	+17.16	− 3.50	−23.93
5	East South Central	20,994	18,030	18,079	158,192	205,454	+39.68	+16.12	−23.00
6	West North Central	37,798	31,000	41,025	336,499	460,408	+21.93	− 7.87	−26.91
7	West South Central	35,179	29,549	33,159	310,690	388,030	+19.05	+ 6.09	−19.93
8	Mountain	12,830	11,096	11,857	116,853	148,287	+15.63	+ 8.21	−21.20
9	Pacific	45,090	36,652	37,537	369,388	454,803	+23.02	+20.12	−18.78
	Total—United States	383,385	318,870	373,162	3,398,232	4,418,720	+20.23	+ 2.74	−23.09

States comprising the various regions are: Zone 1, Conn., Me., Mass., N. H., R. I., Vt.—Zone 2, N. J., N. Y., Pa.—Zone 3, Del., D. of C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4, Ill., Ind., Mich., Ohio, Wis.—Zone 5, Ala., Ky., Miss., Tenn.—Zone 6, Iowa, Kan., Minn., Mo., N. D., S. D.—Zone 7, Ark., La., Okla., Tex.—Zone 8, Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9, Cal., Ore., Wash.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Ethyl Corp. — Malcolm P. Murdock was elected a vice-president and director in charge of sales activities, replacing Sanford M. Wagner, who is retiring next month.

Dodge Div. of Chrysler Corp. — Named to the newly-created post of sales manager-cars was **L. F. Desmond**, and as sales manager-trucks, **William S. Woolsey**.

Hudson Motor Car Co. — **James Ellis** was named to the production staff of the airframe division, as superintendent of the Vernor Ave. plant.

Micromatic Hone Corp.—Recently promoted were **John E. G. Kline** to vice-president in charge of process development and patents, and **Douglas T. Peden** to vice-president in charge of research.

Sealed Power Corp. —Donald M. Resling has been advanced to the position of manager of manufacturing and engineering.

Baker-Raulang Co.—**E. E. McVeigh** has been named manager of commercial sales and **R. T. Tiebout** was named manager of government sales.

Doehler-Jarvis Corp.—**Robert Rasmussen** has been appointed controller of the Toledo, O., plants.

Pacific Airmotive Corp.—**L. B. Littrell, H. Y. Finley,** and **Arthur Williams** are newly elected vice-presidents of the company.

General Tire & Rubber Co.—**Earl H. Schaub** has been promoted to manager, new distribution.

AC Spark Plug Div. —R. Dean Kirk was appointed general production manager, succeeding Charles W. Crick, who has retired.

Ford Motor Co.—**Charles H. Carroll** is now director of purchasing, succeeding the late Carl F. Unruh. **Harold E. Joy** replaces Carroll as general purchasing agent of production parts and materials; succeeding Joy will be **Harold H. Compson** as purchasing agent of the steel purchasing department, and **James L. Toohey, Jr.,** as purchasing agent of the basic raw materials department.

Chicago Pneumatic Co.—**Guy J. Coffey** succeeds the late W. L. Lewis as president. **H. A. Jackson** will continue as chairman. Newly elected vice-presidents are **Thomas P. Harris** and **James H. Huvane.**

Federal Motor Truck Div., Federal Fawick Corp. — Herbert H. Penny is now purchasing agent, succeeding the late Mark L. Burrell.

Hydropress, Inc.—**Wylie Brown,** retired chairman of Phelps Dodge Copper Products Corp., was elected a director and chairman of the board.

Kearney & Trecker—Filling positions at the special machinery division's new plant will be **Morris L. Hutchins,** chief engineer; **Walter J. Hubbes,** superintendent of manufacturing operations; **Harold W. Kippers,** director of sales; and **John P. Bunce,** staff assistant.

Airtemp Div., Chrysler Corp.—**J. F. Knoff** has been named vice-president and general sales manager.

Yale & Towne Mfg. Co.—Michael F. Ryan was appointed production manager for the Philadelphia, Pa., plant recently.

Mechanics Universal Joint Div. of Borg-Warner Corp.—**Arch A. Warner** was appointed president to replace **G. C. Gridley,** who has retired but will be retained as a consultant. Succeeding Warner as president and general manager of Rockford Clutch Div. is **Harry L. Emerson,** previously vice-president in charge of manufacturing. **G. L. Christianson** was promoted to executive vice-president.

United Specialties Co.—**John Hamilton** was named vice-president in charge of sales, and **C. Frank Newburg** was named vice-president, manufacturing.

Consolidated Vultee Aircraft Corp. —**J. V. Naish** was elected executive vice-president, and is succeeded as director of sales and contracts by **J. G. Zevely.**

Bendix Aviation Corp. — **Randall Zimmerman** was named manager of the new N. Hollywood, Calif., plant.

Necrology

Charles M. Gearing, 79, retired works manager of the New Departure Div. of General Motors Corp., died Dec. 14 at his home in Meriden, Conn.

Frederick H. Bedford, Jr., 61, a director of the Standard Oil Co. of N. J. and president of Atlas Supply Co., died Dec. 10 while on a business trip in Barranquilla, Colombia.

Thomas B. Cookerly, 62, retired assistant general manager of GMC Truck & Coach Div., died Dec. 17 at Des Moines, Ia.

TO TURN A TANK TURRET...

Fellows 120"

GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

Cuts a Giant Gear

At the Chrysler Delaware Tank Plant, tank turret gears are accurately finish-cut with six Fellows 120" Gear Shapers.

Here are some of the reasons:

Only a minimum of set-up time is required on the Fellows 120-Inch. Fixtures are rigidly supported and readily accessible, resulting in increased cutting feeds and a saving of work handling time. Gears are roughed and finished in two cuts at one setting of the work. Tool maintenance costs are low, because cutters can be sharpened on any standard rotary surface grinder.

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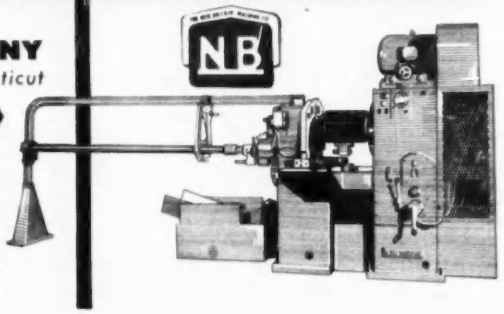

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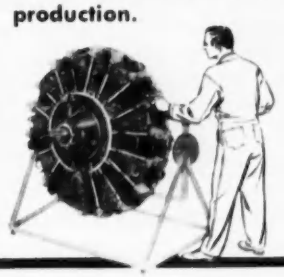

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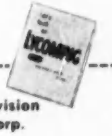

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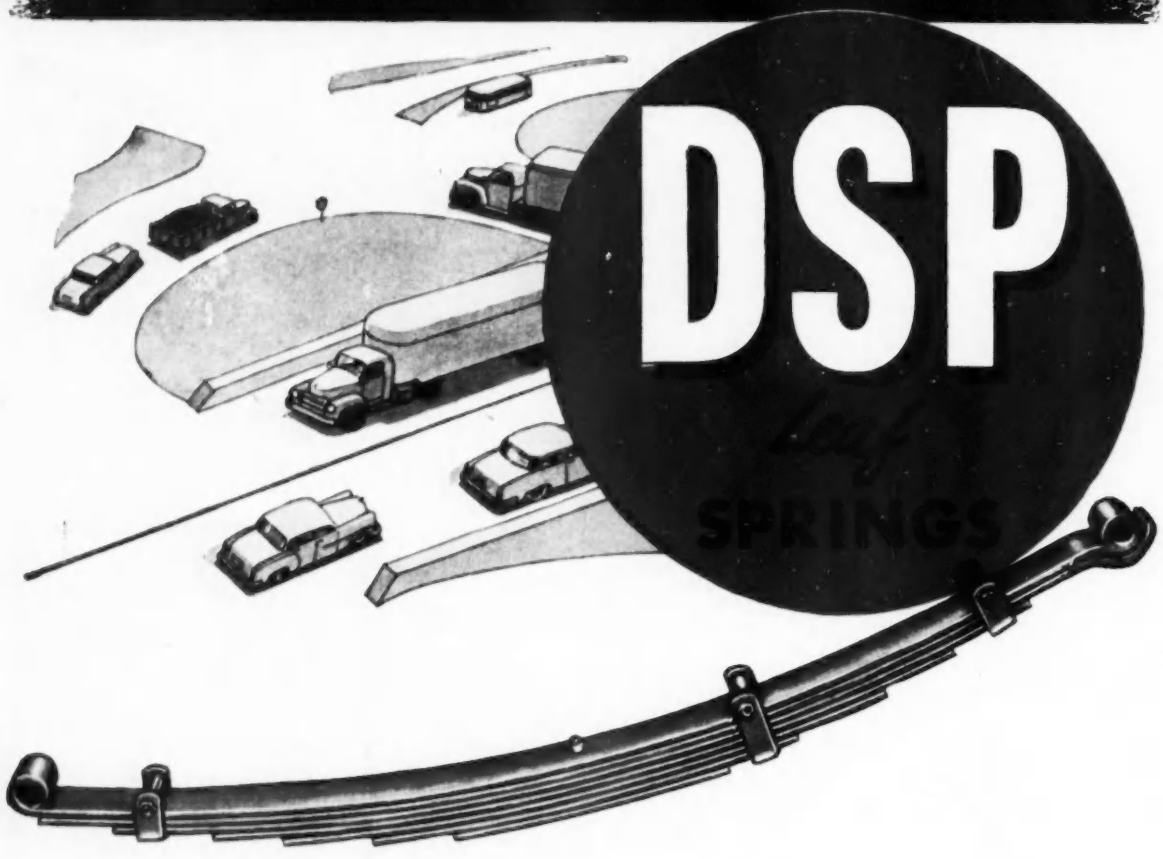

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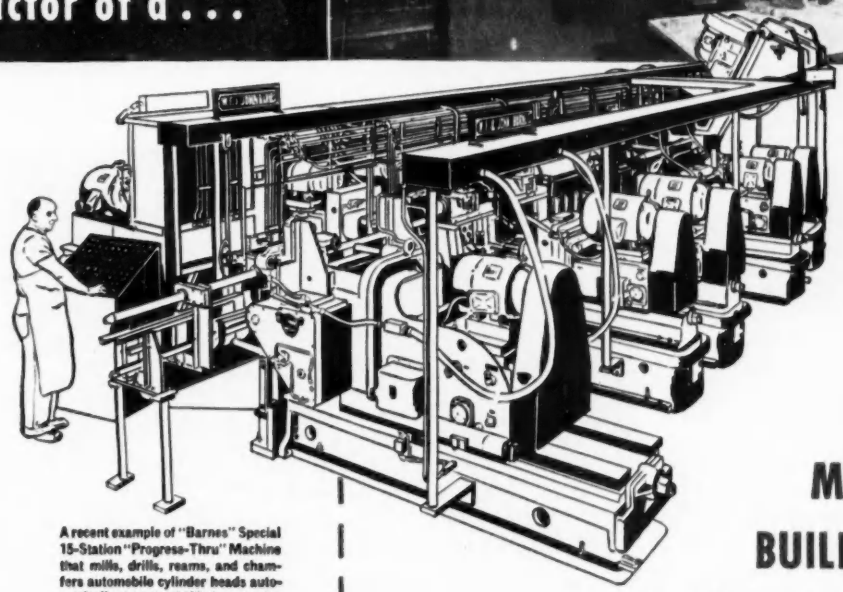
Partial view of Special Machine Engineering Department at Barnes.



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The creative and engineering skills of Barnes people today encompass a much broader field of industrial activity than ever before in the company's 75 year history. Thoroughly experienced mechanical, hydraulic, electrical, process, tool and fixture engineers work together toward a common goal. As a result you get the benefit of a coordinated effort that saves time and trouble. Interchange of ideas insures constant progress in developing new and better methods for increasing productivity and lowering costs.

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In addition, because all planning, engineering, and manufacturing efforts at Barnes are closely coordinated, you get a complete machine tool building service all from one convenient, dependable source. Experience gained over the years enables Barnes Engineers to help you solve complex machining and production problems quickly. When your present or future machining needs call for faster, more efficient methods, it will pay you to call on Barnes for recommendations. No obligation.

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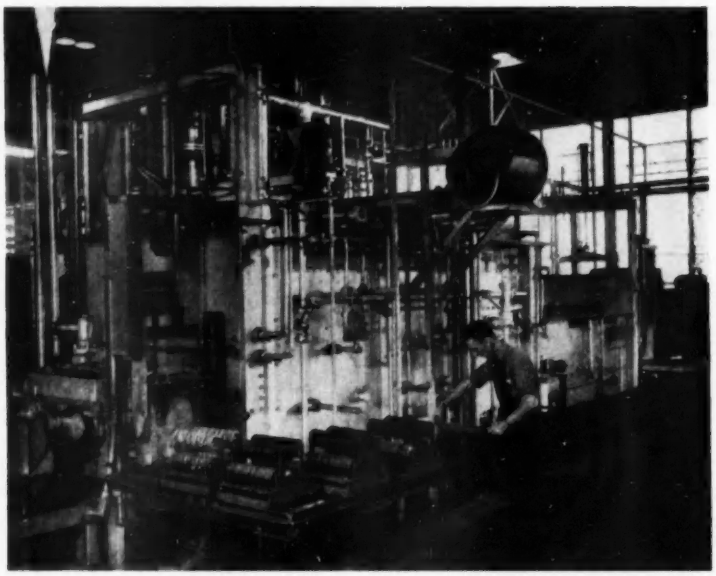
MULTIPLE SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC PROGRESS-THRU AND TRANSFER TYPE MACHINES

Modern Heat Treating of Axle Components

By R. F. Lutz, Plant Metallurgist

Ohio Axle & Gear Div.,
The Timken-Detroit Axle Co.



Thin thrust washers and similar parts requiring high wear resistance are readily hardened in this special Surface Combustion dry cyaniding furnace. It is a radiant tube, pusher type, two-row continuous furnace with a slow cooling zone at the end.

ALMOST 50 years of axle manufacturing are behind the new plant built at Newark, Ohio, by the Timken-Detroit Axle Co. to machine, heat treat and assemble practically all of the parts necessary in manufacturing the finished axles which it produces. Only rough forgings, stampings, castings, and a few assemblies such as brakes are purchased from other TDA plants or outside vendors.

The Heat Treat Department was designed to handle all work required within the plant, and past experience dictated the choice of equipment. The best of ideas obtained over the years in our other plants were incorporated, along with new ideas based on this experience.

Parts heat treated include the many sizes and types of gears necessary in modern automotive axle differentials and transfer cases, drive shafts, axle shafts, steering assemblies and various other parts. The equipment was designed to handle gas carburizing, dry cyaniding, clean hardening, annealing and induction hardening, as well as cleaning and shot peening.

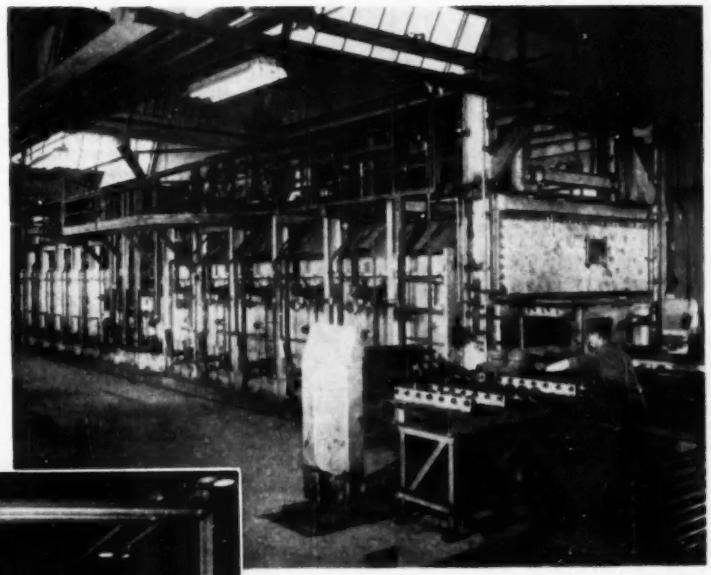
Rough forgings received from vendors are cleaned in a 48 by 48 in. American Wheelabrator Tumblast before annealing and machining. Parts are cleaned after heat treatment by mechanical spray washers and/or an American Wheelabrator Tablast using fine steel grit.

The equipment chosen for annealing low and medium carbon grade alloy steels was a radiant tube, pusher-type cycle annealing furnace built by Surface Combustion Corp. The furnace is divided into five separate zones of heating and cooling control, so that a wide variation in cycles can be obtained. The operation of the furnace is as follows:

Forgings to be annealed are loaded on flat trays and transferred to the furnace loading carriage. The carriage transfers the loaded trays into an air-tight charge vestibule. The trays travel through the furnace on alloy steel rails, moved by a hydraulically-operated pusher mechanism.

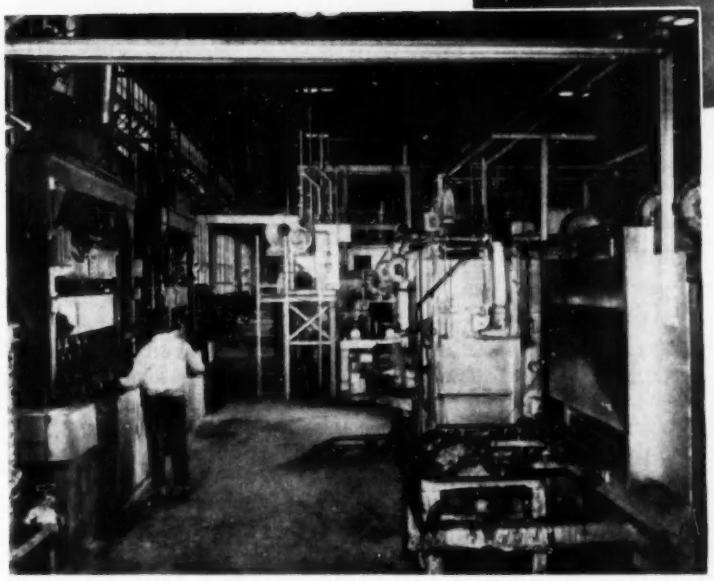
Work is brought up to austenitizing temperature and held there in the first two zones. Burner equipment in these two zones consists of heat-resistant alloy radiant heating tubes, arranged to fire over and under the charge from alternate sides of the furnace. With this form of heating the material being treated is protected from the injurious effects of the products of combustion created by the heating burners.

As the work enters the third zone, it is quickly cooled down to the temperature required for isothermal transformation, and held at that temperature for the time required to complete transformation. This



Low and medium carbon alloy steels are annealed in this Surface Combustion radiant tube, pusher type cycle annealing furnace.

Discharge end of Holcroft walking beam type, clean hardening furnace for hardening rear axle shafts. It is capable of handling up to 60 pieces an hour. To the left is the Gogan roll-quenching machine, quenching the shaft while it is held between pressure rolls to prevent distortion.



is accomplished by using heat-resistant alloy steel pipes, arranged above and below the work, through which air is circulated under pressure. To maintain uniform cooling in this zone, two recirculating fans were installed in the roof. At the exit end of the chamber, two radiant tube burners, one above and one below the work, give assurance that the temperature will not drop below the desired setting for isothermal transformation. These burners are under dual control so as to either heat or cool.

In the slow-cooling zone, tubes of the same construction as those in the heating zone are used, but with the gas shut off, and the air pressure operating to control the rate of cooling of the work. At the discharge end of the furnace there is a steel-jacketed water cooling chamber for further cooling.

The discharge vestibule is of welded, air-tight construction, complete with an unloading carriage similar to the charge end.

Atmosphere gas for the furnace chamber and for purging the charge and discharge vestibules is supplied by a Surface Combustion DX gas generator. The work comes from the furnace clean, ready for machining.

A typical cycle, for carburizing grade steel such as TS 94B17 used extensively by the Timken-Detroit Axle Co., consists in austenitizing at 1750 F, fast cooling and holding at 1150 F, then slow cooling to 500 F. Capacity with this cycle is 3600 lb of work per hour.

Many of the vital parts in axle assemblies require the high wear resistance and core toughness that is imparted by case carburizing. The bevel drive gear and pinion, helical spur gear and pinion, and the differential gears and pinions are all carburized.

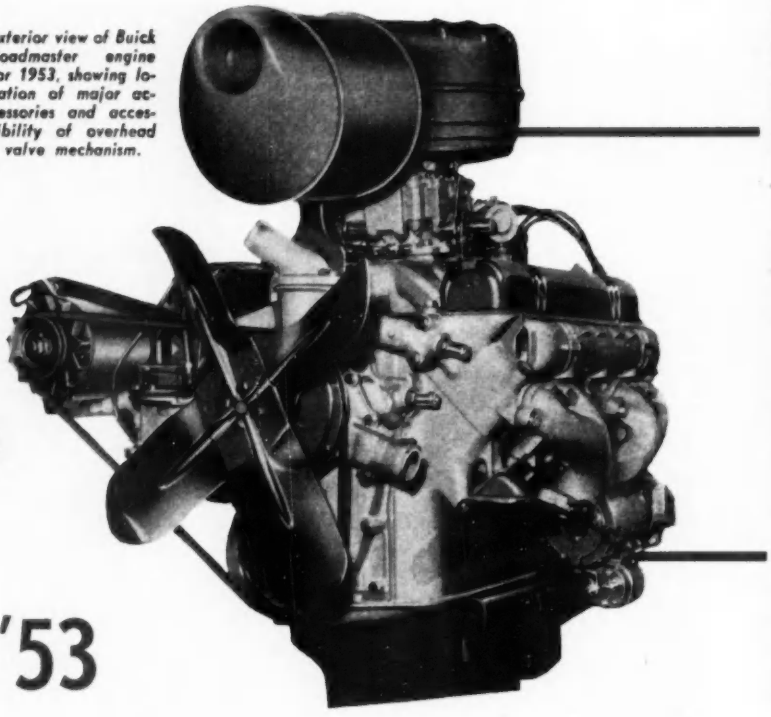
To handle carburizing, four Surface Combustion radiant tube fired furnaces are employed. Three of these are identical, being two-row, pusher type, tray-loaded furnaces, and were erected side by side. Each furnace is capable of producing approximately 450 lb of work per hour.

The charge ends of the furnaces are fitted with air-tight vestibules into which the work is introduced, and which are purged of contaminating air before the door of the furnace proper is opened.

The furnace proper is divided into four separate zones of temperature control. The first three zones are maintained at 1700 F, and the last zone will vary from 1550 F to 1650 F, depending upon the size and type of work being treated.

At the end of the last zone there is a side discharge

(*Turn to page* 122, *please*)



Exterior view of Buick Roadmaster engine for 1953, showing location of major accessories and accessibility of overhead valve mechanism.

BUICK'S V-8 Engine *and New* Dynaflow for '53

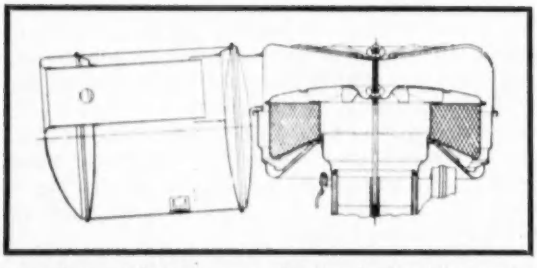
HIGHLIGHTING the offering of the Buick Motor Div., for 1953 is an impressive new V-8 engine for Series 50 and 70 models; and Twin Turbine Dynaflow drive, featuring a radically different type of torque converter. Too, Buick offers the long-anticipated 12-volt electrical system in conjunction with V-8 engines.

Additional features include: Hydraulic power steering, now offered as optional equipment on all series; air conditioning as optical equipment on all closed models in the 50 and 70 series; addition of a one-piece alligator hood, the first time for Buick; and availability of special wire wheel covers or inserts as special equipment.

The regular Buick line consists of the Series 40—available in six-passenger, two-door coupe models; six-passenger two-door sedan; and six-passenger four-door sedan models; Series 50—available in the six-passenger Riviera, six-passenger convertible, six-passenger four-door sedan, and six-passenger four-door estate wagon; Series 70 in a six-passenger four-door sedan, six-passenger Riviera and convertible, and six-passenger four-door estate wagon.

In addition to its regular line for 1953 Buick will have in production its earlier publicized sports car—the Buick Skylark, to be known as Model 76X. It is of interest that the convertible top is made of du Pont Orlon in a choice of black or white. The top is lower than on the 76C model as a result of using a lower windshield, the front and back seat cushions being lowered to retain ample head room. Saginaw power steering, E-Z-Eye glass, hydraulic window lifts, Bendix vacuum power brakes, and chrome-plated wire wheels are standard equipment.

Wheelbase on Series 40 is 121.5; on Series 50 and 70—121.5 and 125.5 in. The chassis for Series 50 and 70 are similar and will mount the same bodies.



New silencer and air cleaner combination developed for the V-8 engine when equipped with a four-barrel carburetor.

V-8 Overhead Valve Engine

A basic 90 deg, overhead valve V-8 engine is introduced in the Super and Roadmaster models. Following the current trend this engine features large bore and short stroke with a resulting stroke-bore ratio of 0.8, one of the lowest in current production.

The Buick V-8 introduces some noteworthy novelties of construction including—cam-contoured crankshaft counterweights to provide uniform clearance with piston skirts; and vertical in-line positioning of valves on the cylinder heads. Basic design characteristics make possible the use of very short connecting rods and result in an unusually compact engine—short,

Condensed Mechanical Specifications 1953 Buick V-8 Engines

	Super	Roadmaster
Type	Valve-in-Head	
Bore (in.)	4	
Stroke (in.)	3.2	
Displacement (cu in.)	322	
Compression ratio:		
Std.	8.0 to 1	8.5 to 1
Opt.	8.5 to 1	
Bhp (max.):		
Std. CR	164 @ 4000 rpm	188 @ 4000
Opt. CR	170 @ 4000	
Torque (lb ft): (max.):		
Std. CR	286 @ 2200	300 @ 2400
Ppt. CR	292 @ 2200	
No. main bearings	5	

provided by the bottom of the timing chain cover. The upper flywheel housing, too, is cast integral with the crankcase.

The main oil gallery, consisting of a steel tube cast into the crankcase, supplies oil to the five main bearings and five camshaft bearings. The hydraulic valve lifter oil gallery extends along each bank of valve lifter holes and opens into each hole to assure adequate oil supply. Two oil passages extending from near the top of the front camshaft bearing supply low pressure oil to valve lifter galleries. A groove in the front camshaft bearing journal meters the correct amount of oil flow. Additional passages carry oil to the overhead valve lubricating system from the valve lifter oil galleries. These passages also serve to bleed air from the gallery.

Cylinder heads are of compact size and reduced width with head inlet ports in close proximity to the carburetor. Two passages in the head lead exhaust gases to outer chambers of the intake manifold to

By Joseph Geschelin

Two-door Super Riviera. It is powered by the new V-8 engine and equipped with the new Dynaflow drive.

low, and which is narrow across the cylinder banks.

Chief difference between engines for the Super and Roadmaster is in the induction system, the Super being equipped with a two-barrel carburetor similar to the one used on 1951 Series 70; while the Roadmaster is fitted with a modified version of the four-barrel carburetor. Engine weight is 635 lb as compared to 815 lb for the former Series 70 in-line 8.

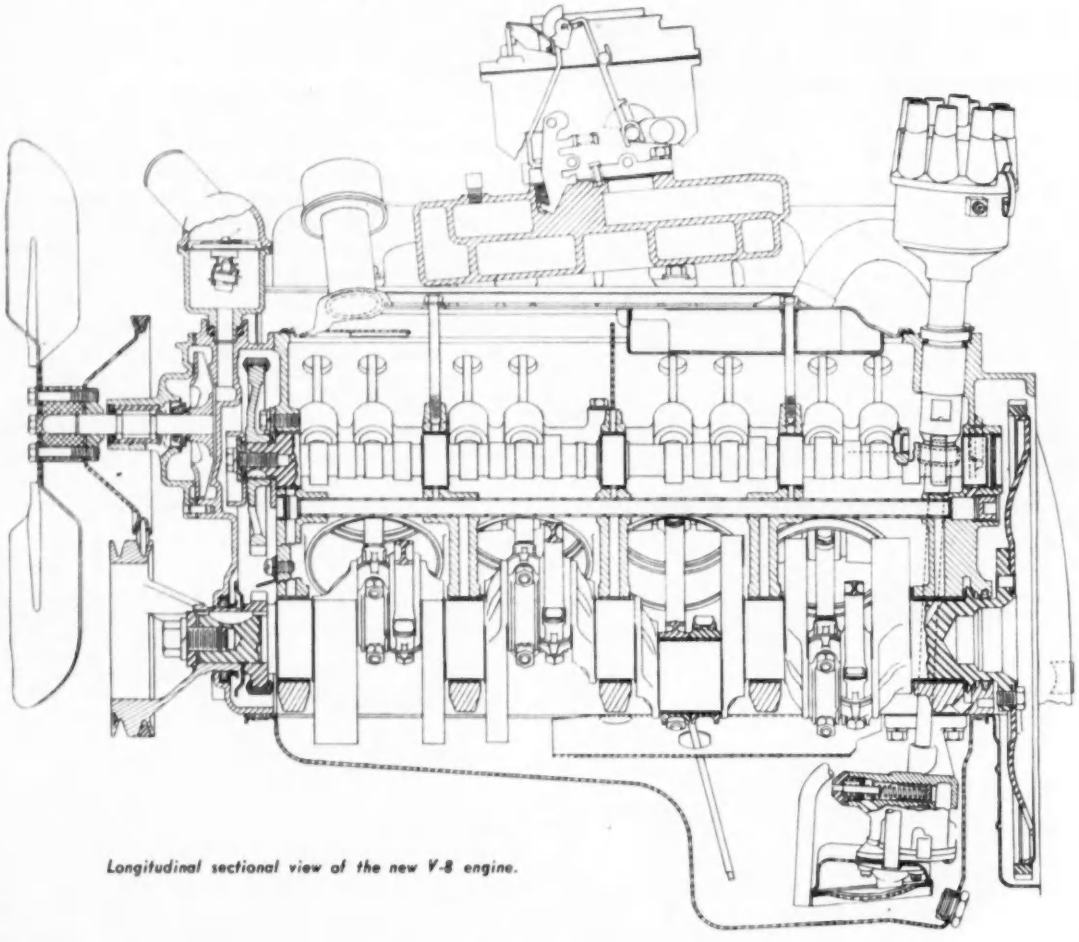
As indicated in the tabular data, compression ratio is 8.5 to 1 on the Series 70; 8.5 to 1 on Series 50 with Dynaflow, and 8.0 to 1 with synchromesh on Series 50. These engines will operate on service station premium fuels.

Referring to the cross-sections of this engine, note that the cylinder block casting extends below the center line of the crankshaft to effect lighter overall construction as well as to permit use of a one-piece oilpan gasket, since the bottom surface of the rear main bearing cap is flush with the gasket face. A continuous flat surface at the front of the engine is provide heat in the dividing sections carrying the fuel mixture.

Exhaust ports are connected to individual branches of the exhaust manifold. The four-port exhaust system and center manifold outlet are said to reduce noise as well as reduce the hazard of valve burning.

Much of the compactness of the engine may be credited to the layout of the valve mechanism in conjunction with the combustion chamber. Valves are positioned at an angle of 45 deg to the axis of the cylinders, thus placing them in vertical position, both valves being in line and on one side of the combustion chamber. The combustion chamber, in turn, is somewhat elongated to accommodate this valve arrangement, the spark plug being centrally located.

To effect closer control of accuracy and uniformity of compression volume, the combustion chambers are machined all over. The formed piston dome is then shaped to conform closely with combustion chamber contour, the top of the crown being cut flat to effect



Longitudinal sectional view of the new V-8 engine.

a compact combustion chamber having excellent quench areas and providing for minimum flame travel from the spark plug to the extreme edge of the effective areas of the combustion space. Close clearance around the lower part of the piston crown provides for high turbulence during the latter part of the compression stroke.

Increased turbulence also is said to be effected by the angularity and positioning of inlet valves and ports. The incoming charge is directed downward and to one side during the induction stroke, resulting in a whirling of the charge about the cylinder axis.

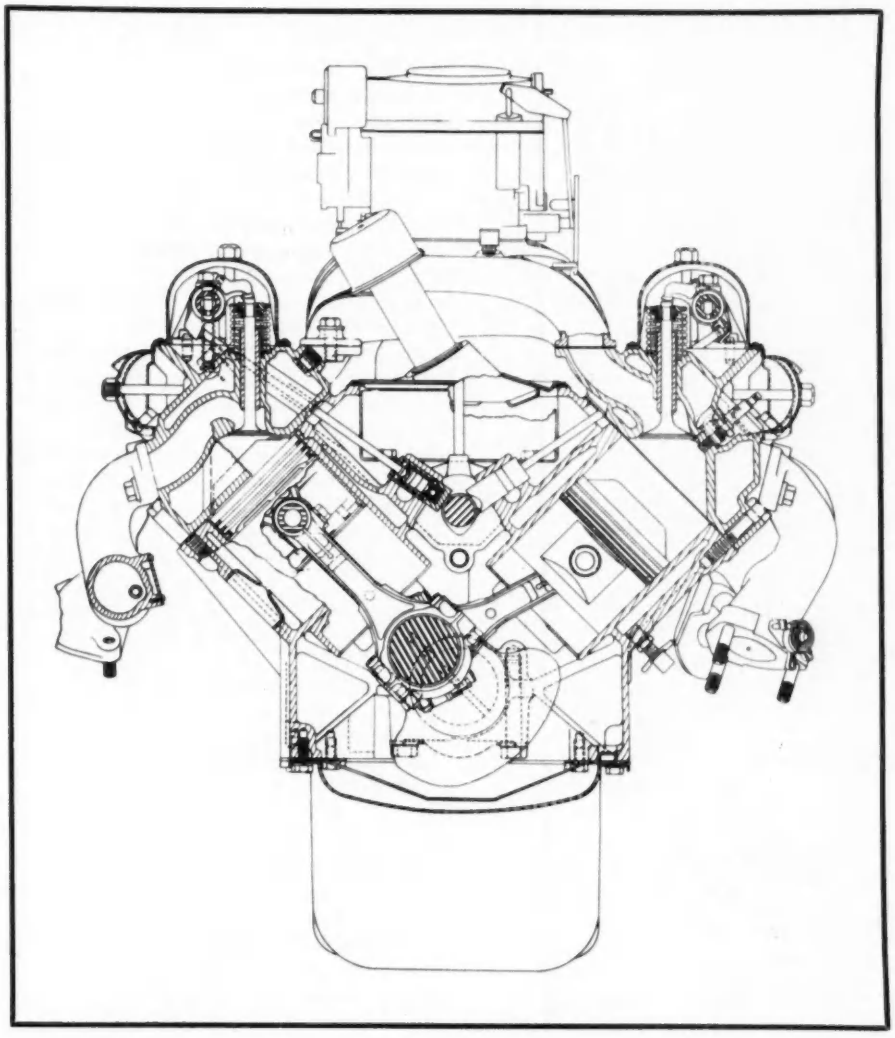
The new crankshaft, of five-bearing design, weighs slightly less than 50 per cent of the weight of the former Series 70 shaft. It is provided with counterweights machined on Hydro-Tels to a cam-like contour for clearance with cylinder barrels and piston skirts.

Full engine balance is effected by balancing the shaft, flywheel, and crankshaft pulley. Flywheel balance is obtained by removing weight in the form of punched holes. The accessory drive pulley is balanced by adding suitable weight, thus providing an effective external counterbalance. When power steering is specified, a double-sheaved pulley is installed to accommodate an extra drive belt.

Pistons are made from permanent mold aluminum alloy castings with a formed crown, anodized after machining. Shallow depressions are cast in the outer surface of the dome to provide sufficient clearance for valves. Three strengthening ribs extend from each piston pin boss to the crown. The center rib continues completely across the underside of the dome while the outer ribs extend angularly from the boss to blend into the dome.

A three-ring setup now is standard, using two cast iron compression rings and one U-Flex oil control ring, all located above the piston pin. Drainage is provided for the oil control ring through six slots.

One of the interesting features of the piston is that the cam-ground skirt remains full because of the machined counterweights. Piston pins are of conventional design, clamped in the rod.



Arrangement of valves, rockers, tappets, etc., are shown in this transverse section of the V-8 engine. Note combustion chamber and piston design.

A full flow oil filter—AC, type PM-9B—is standard equipment, mounted on the lower right side of the block near the rear. A by-pass valve is fitted in the base of the filter to guard against restriction if the filter element becomes clogged.

The water pump is of unique design, and featuring a simplified casting to assure weight and space saving. The impeller vanes face the rear, the space between the front face of the impeller and water pump cover forming a part of the inlet passage. The pump has a single inlet passage and a double volute discharge, delivering equal volumes of water to both cylinder banks.

Coolant enters the block through passages from the timing chain cover, circulates around cylinder barrels and around the water jackets, leaves through openings into the cylinder heads.

The thermostat by-pass feeds from the thermostat housing on top of the pump into a small water passage in the timing chain cover, emptying into the suction side of the pump.

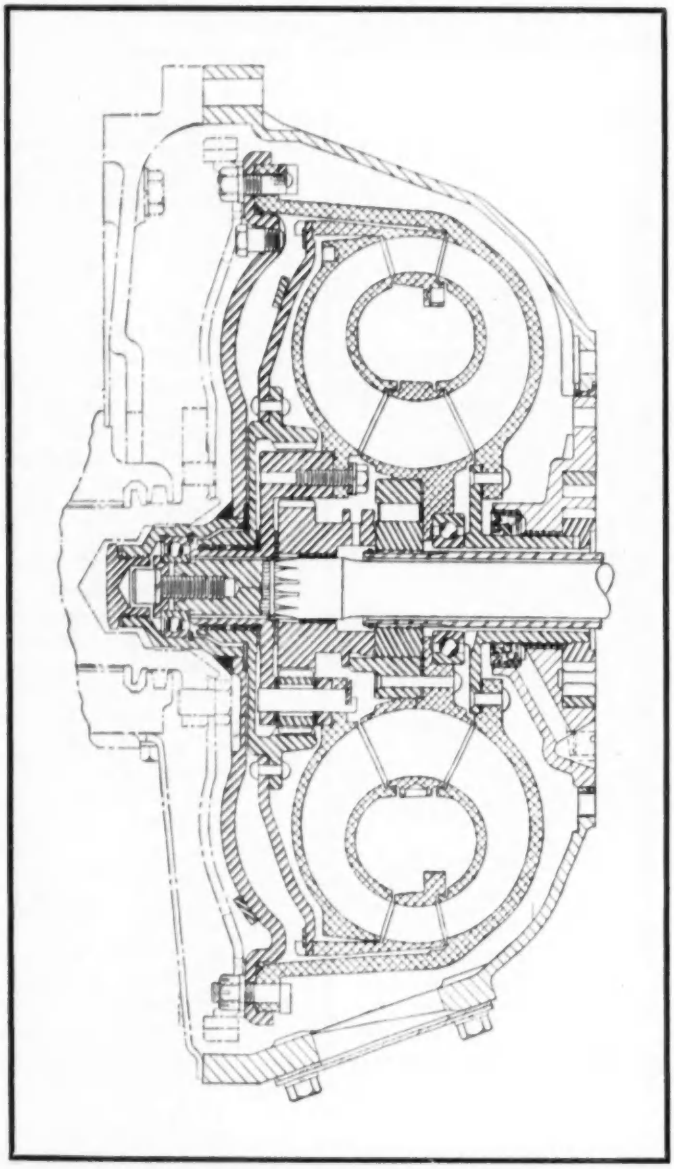
The intake manifold is of dual type with each section supplying the mixture to four cylinders. It contains two horizontal "T" - shaped dividing junctions, one at each end of the main branch. Two cylinders are served by each junction through short, single branches running in opposite directions. The four-barrel carburetor on Series 70 feeds one primary and one secondary barrel into each manifold section; while the dual carburetor on Series 50 cars feeds one barrel into each manifold section.

Exhaust manifolds are installed for each cylinder bank to provide a separate port for each exhaust valve. The exhaust manifold on the left side carries a heat valve controlled by a bimetallic thermostatic spring to hold the valve in closed position when the engine is cold. When the valve is closed, a back pressure is created in the left manifold, setting up a flow of hot exhaust gases through the exhaust cross-over passages in the cylinder heads and intake manifold for heating the fuel mixture.

Warm air for automatic choke control is supplied by a preheating stove located on the exterior of the right hand exhaust manifold.

Series 70 engines are equipped with an Air Power, four-barrel carburetor similar in design to the one introduced in 1952 with the exception of recalibrated metering, idling, and venting systems. Slight modification of external linkage is made to provide clearance with the intake manifold, although the geometry of the linkage system remains the same.

The air cleaner and silencer for Series 70 engines combines a heavy duty oil bath type cleaner with a silencer chamber located ahead of the cleaner to permit the mesh of the cleaner to serve as a flame arrestor.



Torque converter section of the Twin Turbine Dynaflow drive.

This assembly is symmetrical about its longitudinal axis, mounted lengthwise on the carburetor with an additional supporting bracket attached to the thermostat housing. By extending the air intake forward of the carburetor Buick takes advantage of lower air temperatures at the front end of the engine compartment.

The combination air cleaner and silencer for Series 50 engines is of concentric type, resulting in a compact unit combining oil bath air cleaning with low restriction and high noise elimination.

The valve train mechanism employs hydraulic valve lifters and the system is designed to require no lash adjustment in service. Inlet valves have 1¾ in. diameter heads; exhaust valves have 1¼ in. heads. Valves are provided with two concentric springs. Lubrication for valve stems is metered through a hole in the top of each rocker arm, excess oil being drained off and returned to the oil pan through passages in the head and block.

The camshaft is of forged steel supported in five bearings which are pressure fed. The driving mechanism consists of a crankshaft sprocket, camshaft sprocket, and a single outside guide type chain.

Rocker arms for the valve mechanism are offset to effect the proper plane of movement, thus permitting cam lobes to be spaced to best advantage. A tubular rocker arm shaft is mounted on each cylinder head, supported on four die cast aluminum brackets, the front bracket on each side serving as the oil delivery line to the shaft.

Push rods are of one-piece design with an upset spherical radius on each end for proper seating in the lifter and rocker arm.

The exhaust system used with V-8 engines is composed of two separate exhaust pipe sections together with an oval-shaped dynamic flow muffler, and a tailpipe. The front exhaust pipe assembly is made up of a pair of two-in. pipes. The left pipe crosses from the exhaust manifold under the front of the engine and joins the right pipe to form a "Y."

The Series 40 engine remains the same with certain modifications which increase output to 125 hp with standard head of 7 to 1 compression ratio and synchromesh transmission; and 130 hp with 7.6 to 1 compression ratio when Dynaflow is specified. Specifically, the production cylinder head has been changed to move the spark plug location and immediate surrounding area 5/16 in. toward the center of the combustion chamber. At the same time, the piston dome is extended radially so it is flush with the upper piston ring land. This results in a smaller clearance space in the combustion chamber area opposite the spark plug. These modifications raise compression ratio and shorten flame travel.

Twin Turbine Dynaflow

The torque converter section of the Dynaflow drive has been radically redesigned and for 1953 models will feature a four-element unit with two turbines, replacing the former five-element assembly. The gearbox end remains the same as before except that it incorporates all of the detail improvements made in recent production. The new drive will be known as the Twin Turbine Dynaflow.

The new design incorporates the equivalent of a starting gear ratio which provides high acceleration at the start without roar and without perceptible slip.

A single basic torque converter unit is suitable for the entire line of engines. Although torque converters for the Series 40, and Series 50 and 70 engines are not directly interchangeable, actually they differ only with respect to the stator. A difference in stator vane design now adapts the torque converter to any given engine in contrast to earlier practice where it was necessary to use torque converters of different diameters.

Basic elements of the 1953 torque converter are: the pump, first turbine, second turbine, and stator. The two turbines are interconnected through a planetary gear set consisting of a ring gear, four planet pinions, a planet carrier, and a sun gear. The first turbine is assembled to the ring gear of the planetary gear set while the second turbine is bolted to the planet pinion carrier, the latter being connected to the output shaft.

Only one pump is used in this assembly, replacing the primary and secondary pumps employed heretofore. This pump, in conjunction with the pump cover, forms the housing and carries the oil supply.

A single stator replaces the primary and secondary stators used heretofore and is mounted on an overrunning clutch similar to the former design. The sun gear of the planetary gear set also is coupled to the same clutch.

The combination of torque multiplication and the effect of the added gear ratio of 1.6 to 1 gives a maximum torque multiplication of 2.45 to 1 at stall speed. For Series 50 and 70 stall speed is about the same as the previous Series 70; while for the Series 40 it is about 200 rpm less than previously.

In this torque converter, the first turbine is assembled between the second turbine at the front and the pump element in the rear. While car motion is being established during acceleration, the first turbine comes into action and transmits torque to the drive shaft through the planetary gearing to which it is directly attached. As torque requirements are reduced, and torque multiplication no longer required, the speed of both turbines increases and approaches that of the pump. This is accompanied by a corresponding decrease in the effectiveness of the first turbine, and a lowering of the torque reaction of the sun gear to the point where this disappears entirely.

Meanwhile, the speed of the second turbine steadily increases as long as the sun gear remains stationary. During this transition stage the direction of oil flow changes from the front face of the stator vanes to the back faces, gradually eliminating the force which holds the stator stationary. It has been found in this unit that the speeds at which these effects occur are approximately the same, and when these forces disappear the entire unit is permitted to free wheel. By the time freewheeling occurs, both the first and second turbines are rotating at nearly the same speed as the pump and at this point the torque converter functions as a fluid coupling.

The various stages of stator, pump and turbine operation described above do not occur at set car speeds but are dependent upon torque requirements under differing operating conditions. The transition at all times, however, is smooth and shockless.

It is understood, of course, that when the drive is operating with the torque converter in fluid coupling stage any change in torque requirements—demanding increased torque—will be met automatically by the torque converter.

As mentioned earlier, the gearbox end of the drive remains substantially the same as before. However, the planet carrier for Series 50 and 70 drives has been revised to accommodate the increased length of the rear bearing retainer. Both front and rear carriers are made of cast iron. The output shaft, of hardened steel, is now about 5¾ in. longer.

The rear transmission bearing retainer is about 5¾ in. longer with the V-8 engine, to make use of the standard torque tube assembly and frame crossmember location. It has a mounting pad boss which permits use of the same mounting pad as on the 1952 synchromesh transmission.

Power Steering

Power steering, using an adaptation of the Saginaw hydraulic steering gear adopted last year, is offered on the entire line as optional equipment. Overall steering ratio has been increased to 29.1 to 1 on all models to reduce steering effort with conventional steering gear. It is also noted that for Series 50 and 70, power steering requires a different oil pump housing.

Frames for Series 50 and 70 have been redesigned for the V-8 engine, particularly the front cross member which accommodates greater engine width as well as a one-inch increase in front tread. The front extensions reach farther forward on the front cross member to effect greater rigidity.

Lighter pedal pressures and longer brake lining life are promised on Series 70 cars. Lighter pedal pressure is achieved by modifying shoe geometry of front brakes to increase the self-energizing action of both primary and secondary brake shoes.

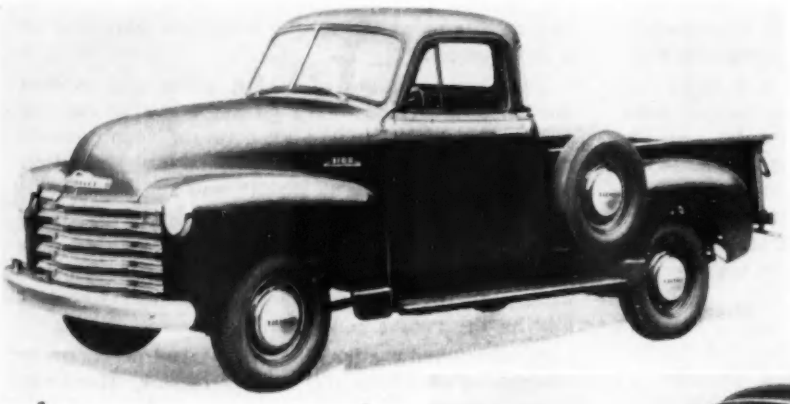
On Series 50 effective brake area has been increased to 207.5 sq in. On all Series Dynaflow models, the brake pedal is larger, and extends farther to the right to permit easier use with right or left foot braking.

Twelve-Volt Electrical System

A general discussion of the features and advantages of 12-volt electrical systems appeared in AUTOMOTIVE INDUSTRIES, November 1, 1952. The following covers more specifically the details of the 12-volt system on Buick V-8 equipped cars. This system

(*Turn to page 99, please*)

Higher



Light delivery pickup truck, one of Chevrolet's 74 models on 11 wheelbases ranging in size from the sedan delivery on a 115-in. wheelbase to a school bus chassis of 212-in. wheelbase. Two six-cyl. overhead-valve engines are offered in the latest truck models. The improved Loadmaster engine, standard in some models and optional in others, has a compression ratio of 7.1 to 1 and develops 108 hp. Among its features are strengthened connecting rods, chrome plated top piston rings, and valve rotators. The Thriftmaster, also improved at several points, is standard on the lighter trucks. A new 45-amp generator is used on both engines. Torque Action brakes are fitted to all except the heavier-duty trucks which have Twin Action brakes at the rear.

Apparent in this view of a four-door sedan in the Two-Ten series are the new one-piece windshield, new fender and hood contours, and a fresh grille treatment. Four-door sedans are available also in the One-Fifty series and the new Bel-Air line.

New Powerglide Drive, Power Steering, and Autronic Eye Offered as Optional Equipment

A THIRD series of cars, redesigned bodies, higher horsepower engines, and a new Powerglide drive are some of the high spots of Chevrolet for 1953. In addition, power steering and the Autronic Eye are offered as optional equipment on all models.

The entirely new series, to be known as the Bel Air, is the most luxurious in Chevrolet history. Other passenger car series are designated as the "Two-Ten" and "One-Fifty."

For 1953 Chevrolet will offer 16 passenger car bodies in its three distinct series. The Bel Air series includes two- and four-door sedans, sport coupes and convertibles. The "Two-Ten" comes in two- and four-door sedans, club and sport coupes, convertible and Townsman and Handyman station wagons. Available in the "One-Fifty" (standard) series are two- and four-door sedans, business and sport coupes and the Handyman station wagon.

Over-all, the cars are lower, but with an increase in headroom and legroom. Fender shapes, both front and rear, make the cars appear longer although over-all they are actually two in. shorter than last year largely due to a repositioning of the bumper. Wheelbase remains the same.

All bodies have curved, one-piece windshields from which the center divider has been eliminated. Other body constructior features include front swingout door hinges to provide easier entrance; fold-away front seat backs in two-doors; and wrap-around rear windows.

The grille has been given fresh treatment in the new models. Three vertical "prop bars" decorate the center element while the outer rim of the grille encircles the parking lamps. Headlamps are embedded in the front fenders with the crown extending into a speedline along the side of the body.

Convenience items include key-turn starting, crank-

Horsepower CHEVROLETS

type front door ventipane controls and almost one-fourth more luggage space. Trunk lid openings have been enlarged and deepened. The sill is now at virtually trunk floor level as an aid to luggage loading.

Driving ease has been additionally improved by a larger steering wheel and the substitution of needle bearings for bronze bushings on the Pitman shaft. Brake and clutch pedal pads have been redesigned for comfort. The parking brake lever has a "T" handle. The driver's compartment has enlarged air ducts. Instruments are directly in front of the driver.

Basically the engines powering the 1953 Chevrolets follow the same six-cylinder, valve-in-head principle as previous models. However, through advances in design, both will provide higher power and more miles per gallon.

Standard Engine Data

In the standard engine the bore and stroke have been changed from 3½ by 3¾ in. to 3 9/16 by 3 15/16 in. Displacement has been increased to 235 cu in. from 216 in the 1952 passenger cars. Compression ratio is up from 6.6 to 7.1. Rear axle ratio is 3.7 to 1. Peak horsepower is 108 at 3600 rpm.

Various modifications have been made to handle the higher power most efficiently. The crankcase is more rigid and stronger. The crankshaft is stiffer with increased counterweighting.

To provide the higher voltage at the spark plug gaps as required by the higher compression, the ignition system incorporates a high tower distributor and new distributor cam. Spark plug nipples are used. New non-metallic resistance-type high tension cables replace certain copper wires. The core of the cable is linen impregnated with an electrical semi-conducting material, and has a neoprene outside jacket.

More complete and uniform cooling of the cylinder barrel is achieved by lowering the water jacket on the right side of the engine in the region of the valve lifters. A by-pass is included in the system so that the circulation is always maintained within the engine.

An automatic choke similar to the device on 1952 Powerglide engines is standard equipment. Generator capacity has been increased to 45 amp.

Powerglide Engine

The engine of the new Powerglide cars develops 115 hp at 3600 rpm. Compression is at 7.5 to 1.

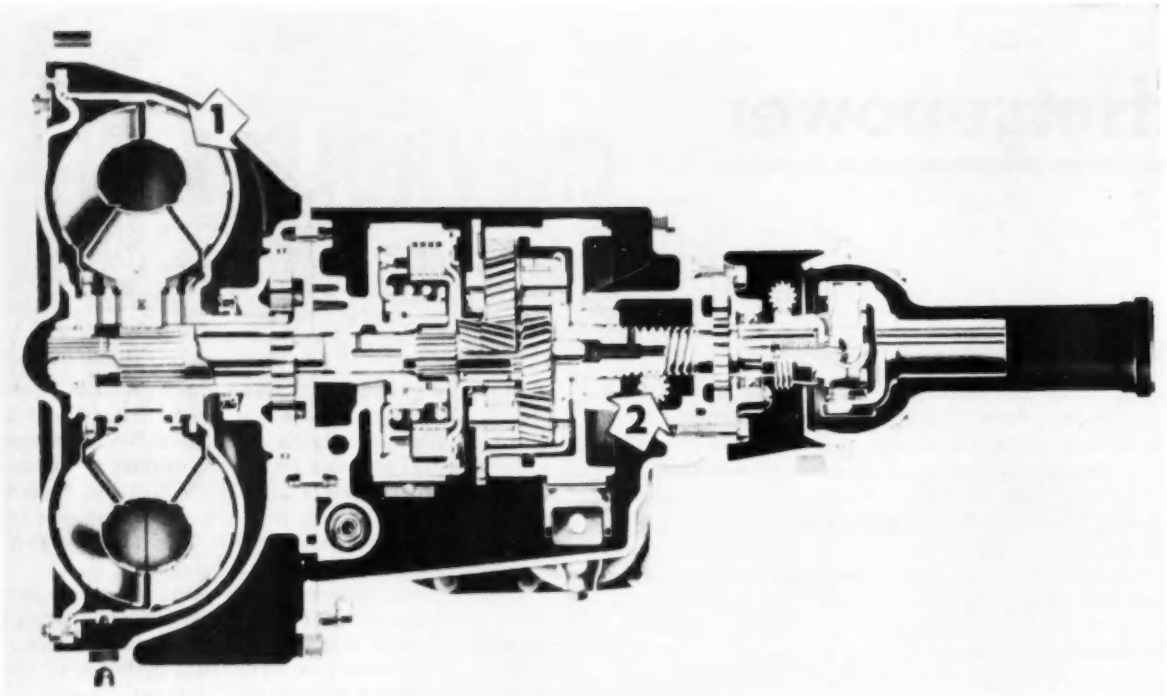
Several features have been included in the Powerglide engine in addition to those in the standard power plant. Aluminum pistons are used. Being lighter, bearing loads are reduced and the use of aluminum eliminates the need for piston pin bushings. Pistons have cam-ground skirts and steel struts to control expansion. Steel backed, thin-wall connecting rod insert bearings have been adopted. They are precision-built and have greater load-carrying ability.

Another new feature is full pressure lubrication which provides oiling of the connecting rod bearings through passages in the crankshaft from the main bearings. The system has involved a re-design of the oil pump to provide more oil at higher pressures.

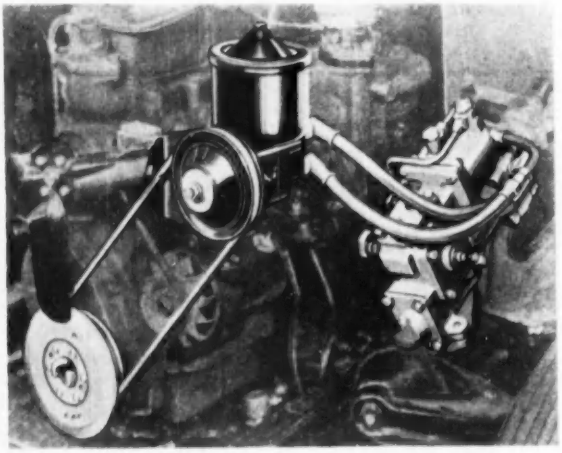
(Continued on next page)

1953 Chevrolet Condensed Specifications

Engine Type:		Six cyl, valve-in-head.
Bore and Stroke (in.):	Conventional	3 9/16 by 3 15/16.
	Powerglide	3 9/16 by 3 15/16.
Displacement (cu in.):	Conventional	235.5.
	Powerglide	235.5.
Compression ratio:	Conventional	7.1 to 1.
	Powerglide	7.5 to 1.
Maximum gross hp:	Conventional	108 at 3600 rpm.
	Powerglide	115 at 3600 rpm.
Maximum gross torque (lb ft):	Conventional	200 at 2000 rpm.
	Powerglide	204.1 at 2000 rpm.
Rear Axle Ratio:	Conventional	3.7 to 1.
	Powerglide	3.55 to 1
Transmissions available:		Three-speed, synchro-mesh transmission regular equipment on all models.
		Powerglide automatic transmission, in combination with 115 hp engine optional at extra cost in Two-Ten and Bel Air models
Steering ratio:		Gear 19.4 to 1 Overall 23.1 to 1
		Power steering available on all models at extra cost.



The new Powerglide automatic transmission is illustrated here in longitudinal section showing the three-element torque converter at the left (arrow 1). An automatic shift, incorporated in the transmission, utilizes a speed-sensitive governor (driven gear of which is shown by arrow 2) and a torque-sensitive throttle valve (not shown).



Hydraulic steering mechanism which is optional equipment. In center is the hydraulic pump with the oil reservoir mounted on its body. It is driven from the crankshaft by a narrow wedge belt. A double-acting piston operates in the cylinder at right, driving a power rack meshing with the sector gear on the Pitman shaft.

Power Steering Optional

Power steering is optional equipment on all models. The Chevrolet application consists of a booster system actuated by a hydraulic pump driven by a V-belt from the crankshaft. The booster is inoperative until an effort of three lb has been exerted on the rim of the steering wheel. The assistance of the booster becomes progressively greater, gradually taking over from the driver so that no more than a light effort is ever required.

As a safety factor, the manual steering mechanism can operate independently of the hydraulic system.

The Autronic Eye which relieves the driver of switching from driving to passing beams when meeting another car, is available as an optional accessory on all models.

The new Powerglide automatic transmission features an automatic shift that supplies a quicker pickup from starts, and faster acceleration in traffic. With the selector lever in Drive, the new transmission always starts in the low range and automatically upshifts to the cruising range as speed increases. At speeds below 40 mph it also downshifts automatically when called upon to provide higher speed for passing, hill climbing, or heavy going through mud, sand or snow. The downshift can be applied by regulation of the accelerator pedal.

Manual low is retained on the selector to provide extra engine braking when required and to permit rocking the vehicle out of ruts by shifting between Low and Reverse.

A larger, more efficient three-element torque converter is used, providing improved cruising economy and retaining the braking equivalent and low-speed push-starting characteristics of the previous five-element design.

Ford Golden Jubilee Tractor

THE new Golden Jubilee model Ford tractor is larger, longer, heavier, and more powerful than previous Ford tractors. It is powered by the new four-cylinder, overhead valve Ford "Red Tiger" engine which is said to deliver substantially more power than any previous Ford tractor engine, yet with increased efficiency and economy.

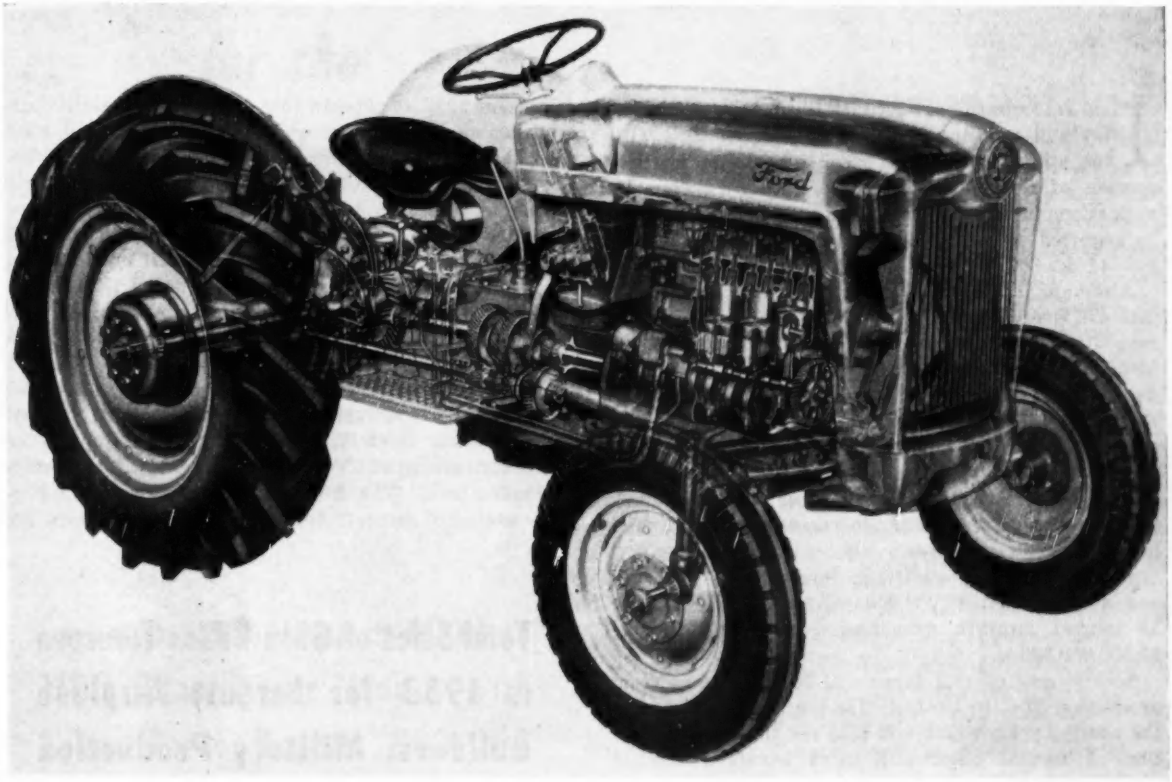
Several features contribute to this added power. The cylinder bore has been increased to 3.4375 in. while the stroke has been shortened to 3.6 in. Engine torque has been increased by about 17 per cent and is rated at 108 lb ft at 1400 rpm. Compression ratio is 6.6 to 1.

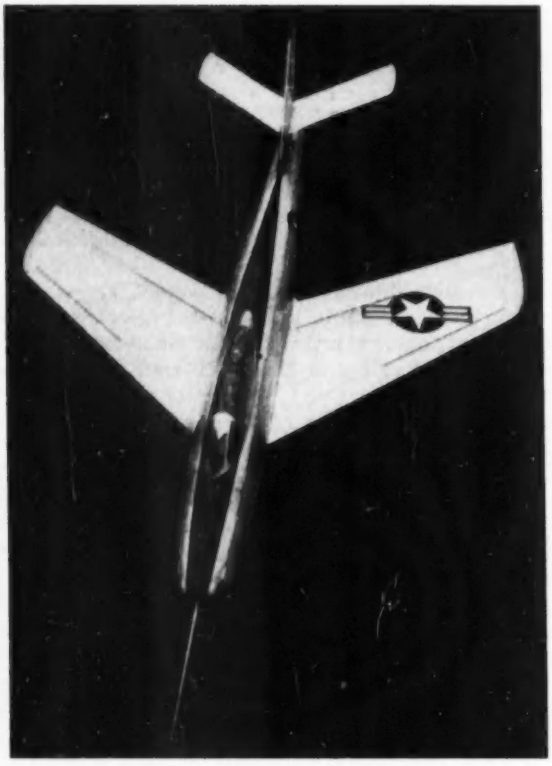
The governor is an integral part of the engine. It is mounted inside on the front end of the crankshaft. A larger diameter race with more balls running at a lower rpm, increases its sensitivity for more positive and rapid response to meet varying loads. Minimum speed regulation has been reduced from 800 to 600 rpm and the over-run reduced from approximately 250 rpm to about 200 rpm. Maximum speed remains at 2200 rpm under no load.

A larger, stronger ring gear and drive pinion have been designed to handle the increased engine power. A separate reservoir permits use of the most suitable lubricant.

A new hydraulic system is an integral part of the Golden Jubilee Model tractor. It is a solid system, completely filled with oil at all times, whereas the mechanism on previous Ford tractors was the cavitating type. The solid system gives positive, split second performance. (*Turn to page* 104, *please*)

Part cutaway, phantom view of the Golden Jubilee Model Ford tractor, showing details of the engine, transmission, steering gear, etc.





This F-84F Thunderstreak fighter, just placed in production by Republic Aviation Corp., is powered by a J-65 Sapphire jet engine (7200 lb thrust), which is being manufactured by Curtiss-Wright Corp. at Wood-Ridge, N. J., and Buick Division of General Motors at Flint, Mich. Maximum speed of F-84F is considerably over 630 mph and its maximum design gross weight at takeoff is approximately 25,000 lb.

Accelerated

Total Sales of $5½ Billion Foreseen in 1953 for Largest Airplane Builders. Military Production

IT IS anticipated that activity in the aircraft industry will continue to accelerate during 1953 with the military programs requiring the major proportion of the industry's efforts. To carry out its obligations in this connection, additional employes will be required, with the labor force continuing to rise beyond the 800,000 mark during the year.

Although it appears that military aircraft production will level off at about the December, 1952, monthly rate—1000 to 1100 planes per month, or some 12,000 planes per year—for the next year or two, production, measured in terms of airframe weight, will continue to increase into the third quarter of 1953. This increase in airframe weight, while unit production remains constant, will result from a reduction in the output of trainers, liaison, and other relatively small planes and a corresponding increase in production of heavier combat airplanes.

This increased productivity, forecast for 1953, will add an estimated $1,200,000,000 to the sales of the 15 largest aircraft companies — a total of some $5,500,000,000.

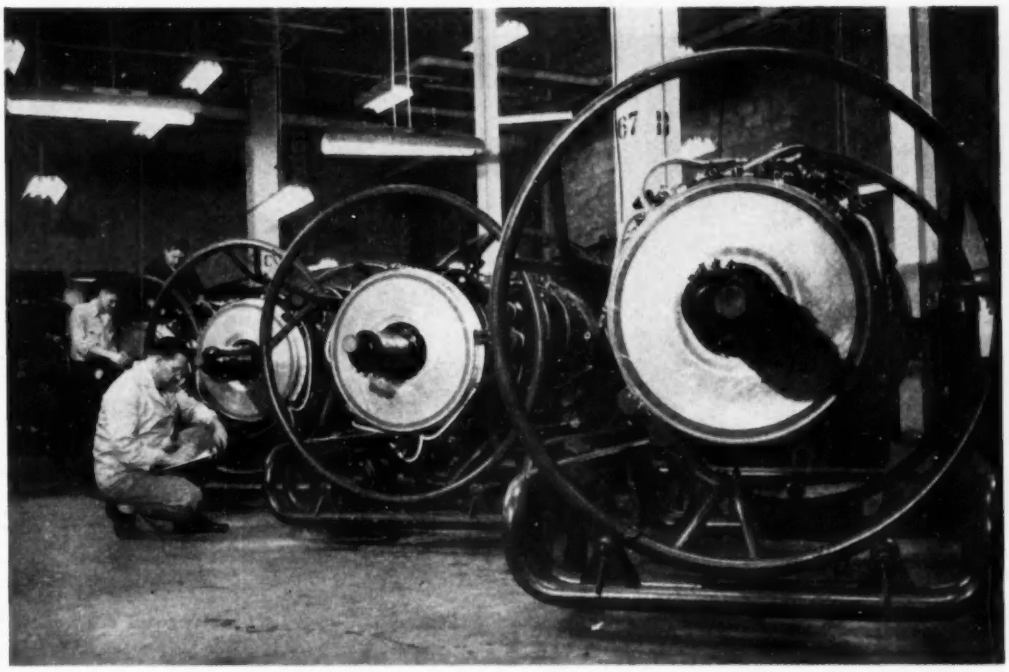
Several new combat types will be turned out from production lines in quantity for the first time during the coming year, which will also see the first production of several other still more advanced combat models. The new year will also see the first deliveries of complete aircraft and engines from production sources not normally engaged in aircraft manufacture, such as automotive industries units, which were brought into the program in 1951. These "outside sources" not only will provide a direct and immediate contribution to our air rearmament program but will substantially increase our production potential.

In addition to the new jet fighters which will be delivered during the coming year, there will be a rapid growth in combat effective jet bomber squadrons and wings as production of these long lead-time aircraft gains momentum. By the end of 1953, there will be a noticeable improvement in both the qualitative and quantitative effectiveness of our nation's air arms.

In the commercial field, a high level of activity also is anticipated. The passing of each year sees an increase in commercial air travel and increased shipments of goods by air. This is reflected in the continued large aircraft orders now on the books of our commercial air transport builders. Production of approximately the same number of transports—400—is estimated for 1953. Based on orders received by the close of 1952, it appears that production of utility airplanes again will increase in 1953 and that production of these types will be at the highest level since 1948.

It is anticipated that the 1954 fiscal year budget will show a reduction in appropriations for aircraft and related procurement. Since these appropriations will not be translated into completed aircraft until 1955 or 1956, it does not appear that the redueed 1954 appropriations will have an appreciable effect on the level of the aircraft industry's activities during the forthcoming year.

The present aircraft production program is designed to rebuild our air arms, and the reduction in aircraft procurement funds for 1954 is the first step in the reprogramming of aircraft production towards a maintenance level. The long-range plans for this reprogramming of aircraft production must be made in the



J-65 turbojet at the end of the assembly line in the Wright plant.

Activity Ahead *for the Aircraft Industry*

By Admiral DeWitt C. Ramsey, USN (Ret.)
President Aircraft Industries Association

forthcoming year. The result of this planning will, perhaps, be the most important policy decision concerning U. S. air power that will be taken during the year. It is hoped that these plans will provide for an orderly return to lower production rates, so that their impact will have the least disturbing effect upon the performance and potential productive efforts of the aircraft manufacturing industry.

Expected to Continue at 1000 to 1100 Planes per Month with Labor Force Beyond 800,000

Aviation Highlights of 1952

As in 1951, the dominant element in the national aviation scene during 1952 was the effort devoted to rebuilding and re-equipping U. S. military air arms. By year's end, the aircraft manufacturing industry had become the nation's second largest industrial employer and military airplanes were coming off production lines at a monthly rate of 1000 to 1100 planes. In addition to the acceleration of the military plane production program, commercial transports were being delivered to the nation's and the world's airlines in increasing numbers and substantial unfilled orders for these aircraft still were on the manufacturers' books.

Helicopter production continued to accelerate throughout the year. A new production record for aircraft of this type was set almost every month as use of this newest form of transportation, military and civil, increased. Manufacturers of utility airplanes, with sufficient materials made available for production of defense-supporting light aircraft, increased output of business and agricultural planes while continuing to play an active role in subcontracting work on the military production program.

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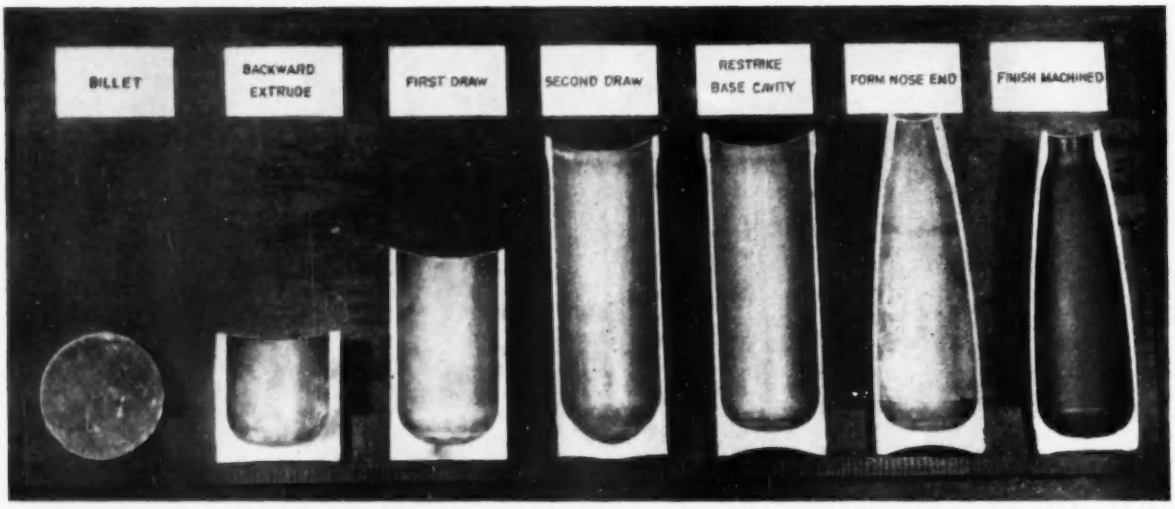


Here are the seven basic steps developed by Pontiac for producing 4.5 in. rocket heads. Of these only five steps are press operations incident to cold extrusion. The first stage is the billet while the last stage represents the only machining required on this part—threading of both ends.

COLD EXTRUSION

Saves Time and Material

By Joseph Geschelin

COLD extrusion, a technique offering great possibilities for revolutionizing conventional forging practices, is a relatively new art accelerated from its inception by the Ordnance Corps. Wherever its application is practical, it promises lower costs, virtual elimination of chips, less machining, and improved quality.

One of the most recent applications is found in the newly created department at the Pontiac Motor Division, General Motors Corp., which contains an integrated setup for producing 4½-in. rocket elements for Ordnance. We are indebted to the management as well as the Ordnance Corps for an opportunity to present some of the highlights of this unique cold extrusion operation.

Although some well known companies have been engaged in this work for a number of years, the Pontiac activity represents some of the latest developments, and offers additional avenues for short cuts and cost reduction.

The basic steps in making the shell body consist of the six stages shown in the cutaway sections. Only five press operations actually are involved. Fabrication begins with the billet, a thick disk—2½ in. thick cut from five-in. diameter HR steel bar. Press operations are performed in a battery of Clearing mechanical presses.

The first operation—backward extrusion—holds the key to the entire process. Proper selection of the steel and its treatment prior to extrusion, application of a special Parker phosphate coating plus a soap bath and unique punch and die design combine to produce a 68 per cent draw ratio in the first setting, thereby eliminating at least two or three of the usual steps. The Clearing press selected for this operation is a vital factor in this equation. A massive mechanical press with a rating of 2500 tons, it is fitted with a 4200-ton drive so as to make it capable of exerting full rated pressure at least 2½ in. from the bottom of the stroke.

Each of the main presses is served by an Ajax salt bath for annealing. The part is annealed after each operation to facilitate plastic flow, making it possible to end the final operation with specified hardness and

First step in cold extrusion at Pontiac is backward extrusion, resulting in a 68 per cent draw ratio. The Parkerized billet may be seen in the enormous die block in this 2500-ton Clearing mechanical press. Some impression of the nature of this operation may be gained by noting the extruded piece being handled by the operator.

in Making Rocket Elements

tensile strength. Mention was made earlier of the Parkerizing treatment on the billet or blank. Since this holds the key to the lubrication which reduces the friction between the work and punch-and-die, a fresh coating is applied between draws immediately following each salt bath treatment.

The next two operations—1st and 2nd draw—each effect a draw ratio of 35 per cent and each one is handled in a 250-ton Clearing mechanical press fitted with a 500-ton drive. The fourth operation serves to restrike the base cavity as well as to gather material at the open end to provide the thick wall at the nose section. This is handled in a large 1000-ton Clearing press. Final major operation is the formation of the nose end in a 350-ton Clearing press.

It is of interest that since nosing affects only a portion of the body, annealing after restrike of the base cavity is done only on the upper six-in. section of the forging. By proper control of these steps, the entire forging after nosing will have uniformly high tensile properties.

As will be noted later, the entire process is in a fluid state of continuous improvement, stemming from gathering production experience. One of the secondary operations now in process of installation is a press trim at the upper end prior to nosing. Since no machining is done on the rough forging, control of every step is critical. Current production runs have shown that even slight variations in the form of the round bars, a tendency to a slightly oval section, for example, will result in variations in the length of the forging. Such effects, assuming they are on the plus side, will be corrected by the trim operation.

After nosing, the forging is given a stress anneal in the Ajax furnace for a cycle of about 20 minutes at 900 F. Annealing between press operations is done at around 1250 F, the partial anneal prior to nosing being done at 1175 F.

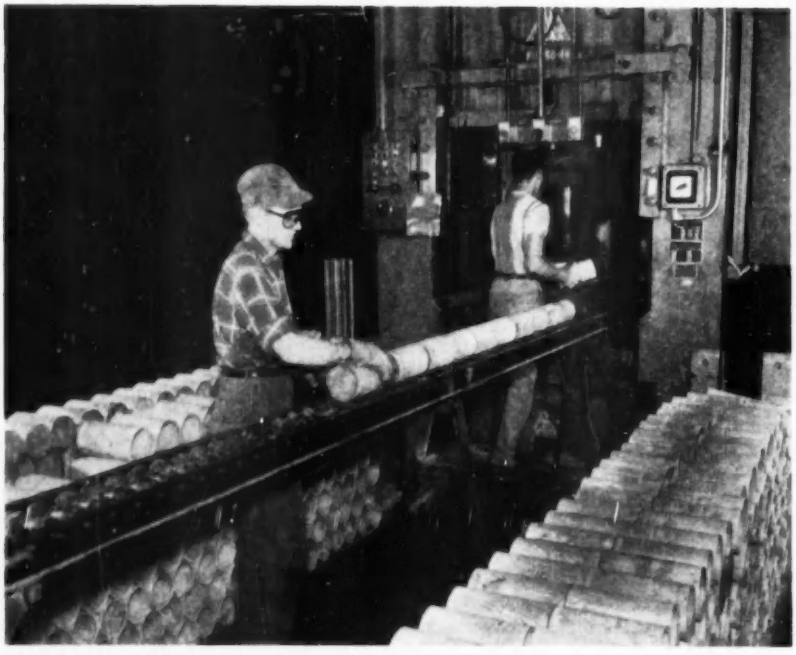
At the present writing the steel specified for cold extrusion at Pontiac is about equivalent to an SAE 1015 hot rolled bar, spheroidized annealed at the mill. As received, it is usually coated with a heavy scale which defies removal by pickling. At present, scale is being removed by a combination of steel shot blasting and pickling. Further development is under way to simplify these operations.

After each draw, surface hardness is high and salt bath treatment is utilized to reduce the effects of cold work. Maximum physical properties are developed at the end of the operation, principally through cold work.

In its current work, Pontiac has found that the selection of the steel from the standpoint of chemistry and type of physical structure exerts a controlling influence upon the success of cold extrusion. At present, they prefer a steel containing from 0.12 to 0.17 per cent carbon; and specify a spheroidized annealed structure. The proper type of structure is of vital importance and constant studies are being made to determine a preferred treatment.

While it appears difficult to rate the major variables in their proper order of importance, it seems certain that the phosphate coating loaded with the soap-base lubricant makes the difference between a successful job and a failure, other things being equal. Although the art appears to have preceded theory, experimental evidence is that friction between the blank and punch and blank and die is the major hurdle. At Pontiac, where actual pressure on the billet is 1800 tons, the effect of the phosphate coating is to reduce friction to such an extent that the maximum temperature does not

Interesting feature built into this Clearing press is the unique curved tubular track conveyor for unloading forgings after extrusion. As shown, the forging is permitted to drop downward through the die and is moved upward to the inspection station at the rear by the pressure of succeeding forgings. It will be noted that after extrusion and subsequent salt bath treatment the coating must be renewed.



This view taken at the loading end of one of the Clearing extrusion presses draws attention to the method of linking salt bath and press feeding with drawing. The special gravity roller conveyor seen in the foreground is fitted with spool-shaped rubber rollers and is used in this case for feeding the die; in other instances, as a means of transporting forgings to the salt bath.

exceed around 450 F. The part can be handled with bare hand almost immediately after withdrawing from the die. Conversely, if anything is wrong with the coating the extrusion simply cannot be completed.

Similarly, the success of the job depends upon the structure of the material. Unless the steel is properly treated and made receptive to plastic flow the extrusion cannot be completed within the limits of available pressure nor can it be controlled. In fact, it has been found that subtle variations in steel quality from one heat to another mark the difference between success and failure. One unfailing indication of steel quality is any marked increase in pressure required to complete the operation.

We have noted the importance of steel quality and lubricant coating in effecting proper control of cold extrusion. Without proper die design and construction, neither of these elements will make for a successful process. By repeated cut-and-try methods, working from failures progressively to successes, Pontiac has established a formula for punch and die design. They have found that entrance angles as well as the form or curvature of the end of the punch are responsible for success or failure. Further production experience as well as studies of punch life will determine definite formulas for these characteristics.

Besides the characteristics of physical form, the life of punches is related to the kind of material and its treatment. At present punches are being made of high-speed-steel composition. Heat treatment as well as the utility of hard chromium coatings are subject to further studies.

Die design, too, has undergone constant study. Pontiac

has established that with the enormous radial pressures developed during extrusion, nothing but the best kind of alloy steels are capable of withstanding this loading. Die shoes are made of chrome-moly alloy and heat treated, while rings are made of graphitic steel. Besides using high tensile alloy steel in dies, it has also been demonstrated that die shoes and rings must be of out-size compared with usual practice.

Mention was made earlier of the significant advantages of cold extrusion. It is amazing to learn that with proper control of the many variables, dimensional control is superior to many heavy machining operations. For example, size on all dimensions as well as wall thickness is held to a total tolerance of 0.010 in. In a properly engineered job there is no waste whatever, the weight of the billet controlling final weight of the part to extremely close limits.

These statements take on particular significance when one considers that in WWII the manufacture of large shells required considerable heavy machining operations between forging stages. With cold extrusion the job is accomplished without machining at any time and the finished part is ready for use without machining except for cutting threads at the nose and base ends. It was these considerations that impelled Ordnance to encourage the development of the new technique. Regardless of initial costs of development, cold extrusion pays off handsomely in ultimately lower costs, greatly increased productivity, and complete conservation of the necessarily critical materials.

But there is more to this military-inspired development than savings to the Government on expendable materiel. Cold extrusion promises to emerge as a technique that will revolutionize present forging practice in the normal civilian metal working industry. There are bright prospects of employing it for making symmetrical parts such as stepped transmissions shafts, rear axle pinion shafts, ring gears and other types of gear blanks, perhaps even forged pistons.

It will mean that such blanks can be prepared by cold extrusion methods directly from suitable billets without scrap, without preliminary machining, and to dimensions comparable with rough-machining operations. In turn, this procedure may well simplify the usual finishing operations materially by eliminating many steps in the machine shop. By holding so closely to size, the amount of chip production will be reduced, again reducing scrap and scrap handling, reducing the number of tools as well as tool maintenance. In short, cold extrusion sets up a whole series of simplified operations for reducing cost and increasing productivity.

Meanwhile, the experience gained in military production will develop both the theory and the art to the point where mathematical analysis will supplement cut-and-dry procedures, thus reducing the variables to more nearly known factors.

• • •

Piston and Ring Setups for New Car Engines

By Joseph Geschelin

ALTHOUGH cost exerts an important influence on piston and piston ring design, it is apparent that the universal swing to three-ring setups on the new passenger car V-8 engines is dictated primarily by space economy in engines of relatively short stroke and uncommon compactness. Needless to say, some cost saving results from the elimination of an oil ring.

Compactness, together with short stroke characteristic of the new V-8's, have combined to dictate a shorter, stronger piston and generally of slipper type to provide adequate skirt bearing within the limitations of clearance with rotating members. In one of the new engines to be introduced this season, the crankshaft counterweights are cam-milled in such fashion as to clear both cylinder barrels and pistons, thus making possible a full length, full contour skirt.

Piston ring specialists are unanimous in their opinion that although a two-oil ring setup in the conventional four-ring design is less sensitive to initial ring and cylinder bore inaccuracies as well as offering more security from oil pumping, the fact remains that the three-ring design is perfectly acceptable. A noteworthy feature of many current three-ring designs is the adoption of expander type oil rings. Since most of these rings have tensions around two to two-and-one-half times that of the single snap rings formerly employed, it is reasonable to expect that the overall sealing effect is about the same.

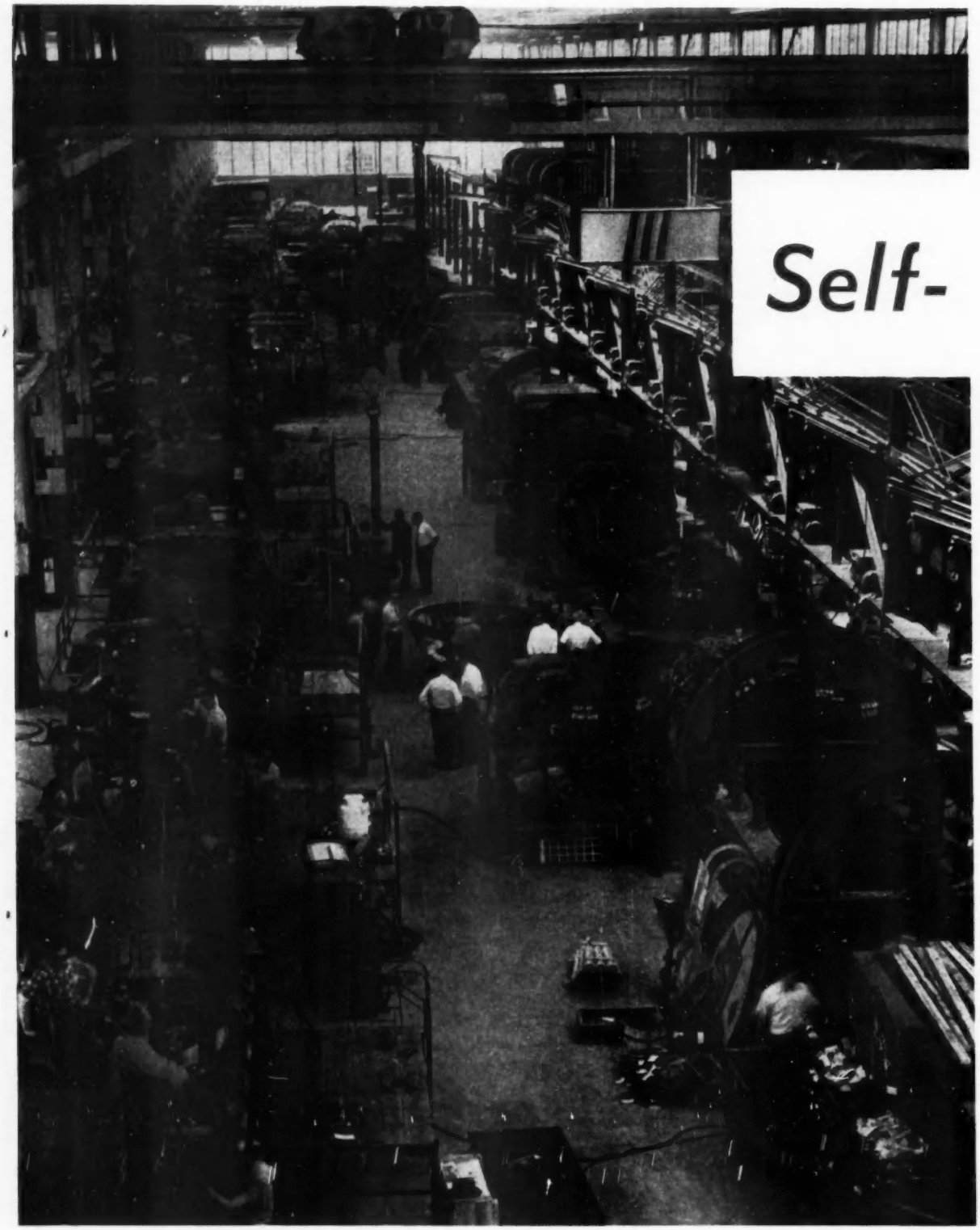
One of the contributions of the expander type oil ring emphasized by piston ring specialists—and unquestionably appreciated by the engine designer—is that of locating the oil ring gap on the inside or high side of the V. In this secondary function, the expander prevents rotation, thus holding the ring in a set position. It is claimed that this feature aids in reducing spark plug fouling, particularly under conditions of high vacuum or deceleration.

Current three-ring setups, in the main, use narrow compression rings and a wide—3/16 in.—oil ring to obtain less inertia and better conformability of the narrow rings together with wider slots and better resistance to plugging in the oil ring.

Several engine designers have commented on the fact that friction losses appear to be unaffected by the change to a three-ring piston. This confirms current test results by piston ring experts and may be attributed to some extent to the use of the higher pressure expander type oil ring. On the other hand, friction losses in the new V-8's have been reduced so materially in other directions that piston ring friction or oil shearing may become more important percentagewise and may open the way to further investigation.

Several other advanced features are equally noteworthy but more subject to scrutiny and debate. We refer specifically to the chromium-plated top ring; and the advisability of installing a steel snap ring or groove liner in the top face of the

(*Turn to page* 102, *please*)



Self-

In this bay, various welding operations are carried out on the tank hulls and turrets.

By
Thomas
Mac New

Propelled Fixtures

Expedite Operations

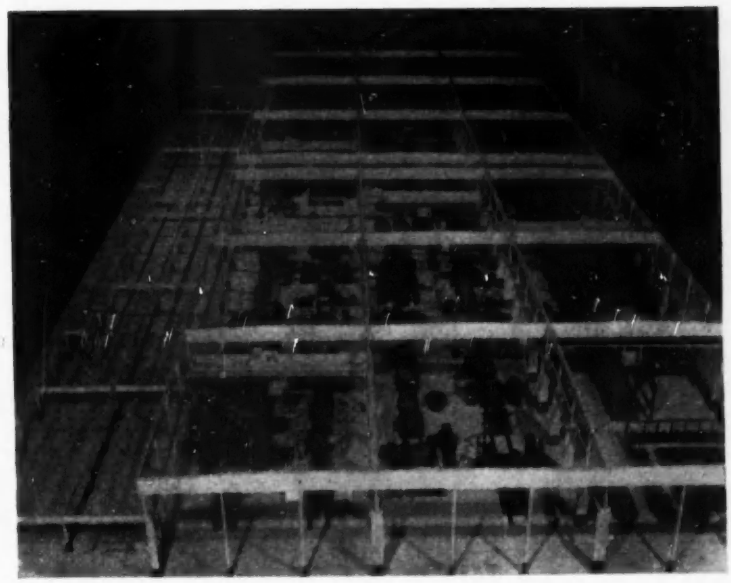
at Budd's Tank Plant

FEATURING a unique totally mechanized machining line, the new multi-million dollar Budd Co. Hunting Park Tank Plant located in Philadelphia, Pa., will supply tank hulls and turrets to the Chrysler Delaware Tank Plant under a subcontract agreement. Many of the 135 machine tools, approximately $7 million dollars worth, have been installed in the plant where components for the recently unveiled Patton 48 (T-48) medium tank are machined, welded and painted.

The inside of the plant is laid out like a huge transfer machine with a line of Budd conceived and engineered individual self-propelled machining fixtures or dollies running between two banks of machine tools for a length of four aisles. Each dolly or fixture is equipped with an electric inching button, retractable wheels, four hydraulic cylinders, and a large electric driving motor. It has a combined weight of 35 tons with a tank hull in place. Two different tracks are utilized for the fixtures. On one side, the track is in the form of an inverted vee while the other side is flat with a cross vee for locating the fixture in relation to the machine tool to be used. Different self-propelled units are used for top and bottom machining of hulls and turrets.

One of the first operations on the upright side of the tank hull is the rough boring of the turret ring on a special Morton vertical mill. A similar mill is used for the finishing operations on the ring.

For milling operations on the hull, four Motch & Merryweather milling machines have been installed. These machine tools are mounted on special ways with two machines on each side of the self-propelled line. For the next operation, profiling of the driver's hatch opening, a Morton profile is set up.



This illustration of a scale model of the Budd tank plant shows how the production machining line is laid out.

Drilling and tapping operations on the hull turret ring are carried out by three Cincinnati Bickford radial arm drills and one Kaukauna angular drill. Another Morton profiler mills the rubber seal groove; this is the final operation on the top of the hull.

The hull is then turned over and set up in another self-propelled machining fixture. At the first station for operations on the bottom of the hull, six Motch & Merryweather milling machines of the three station type are utilized for the milling of pads. To do the job, these general purpose machines are put in pits.

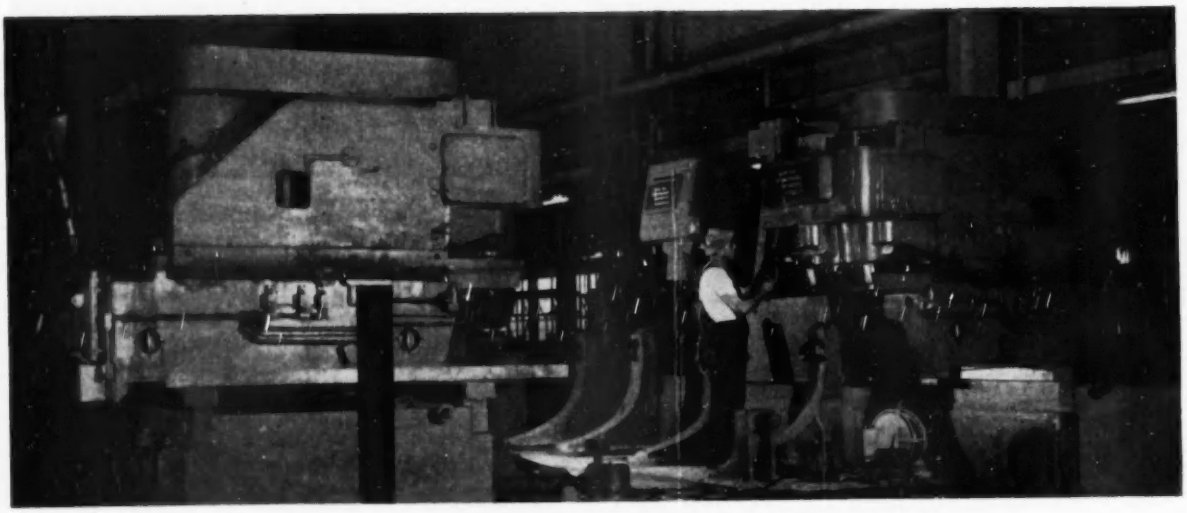
At the next station, four Giddings & Lewis horizontal boring mills are brought to play. Following boring of the idler and cross drive openings, the machining fixture will come to rest at a dead station. An overhead crane is then used to pick up the entire hull and machining dolly together and transfer the unit to the next machining line.

Two specially designed Mercury grinders then grind a total of six pads on the hull. The machining fixture is moved to the next station where two Natco, semi-automatic, multi-drilling machines, one on each side, operate and index, until all pads have been drilled. After the drilling stations, Natco special machines are similarly positioned for the tapping operations.

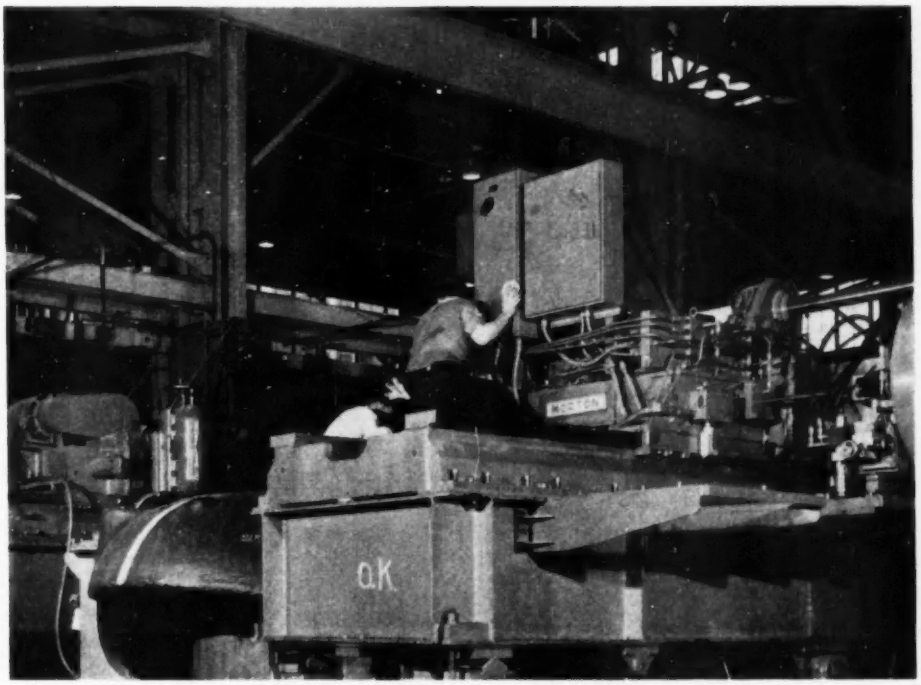
At this point in machining the tank hull, certain operations must be done at each end of the hull. In order to do this in a minimum of time without further locating, a plan has been engineered to turn the complete machining dolly and tank hull 90 deg and secure each fixture to a special conveyor. This special conveyor was worked out by Budd engineers in conjunction with Link-Belt Co. Some of the tools along the eight-station end machining line are mounted on special ways to feed into the work and then back off.

The first metal removal operations on the hull end line are carried out by a standard Morton profile mill. This machine tool has been installed on a

A special high angular base has been built to suit a standard Morton profiler to a special operation on the hull end line.



These four Motch & Merryweather units mill the top of the hull turret ring.



By mounting this Morton profiler on a trunnion with special hydraulic jacks for tilting the tool five deg., a general purpose tool is used for a special operation on the turret line.

special angular base equipped with ways for traversing.

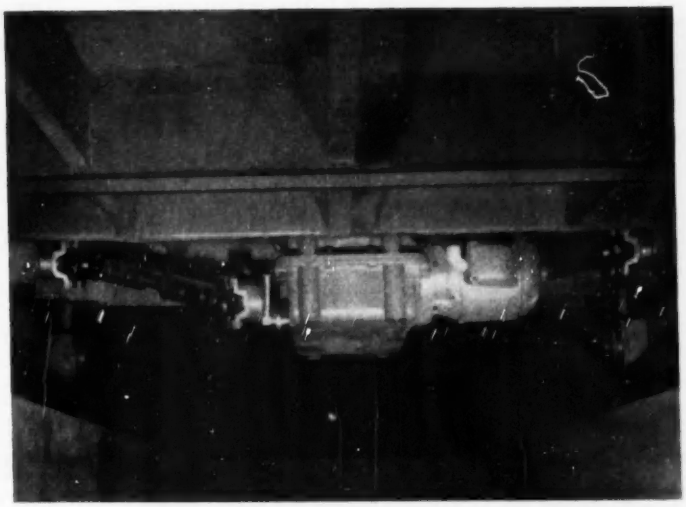
Other operations along the line are performed by Natco, Morton, Cincinnati Bickford, Kaukauna, and Cincinnati Gilbert equipment. The Natco units are the multiple spindle type and are used for drilling and tapping. A high reinforced concrete pedestal has been devised for mounting the Morton profiler. Drilling and tapping on the hull ends is done by the Cincinnati Bickford radial arm drills and Kaukauna angular head drills. At the next to last station on the line, the Cincinnati Gilbert horizontal boring mill is utilized.

A rather unique piece of equipment is used for the fine metal removal operation on the hull. This machine tool, a special portable Mercury Grinder, is lifted by means of an overhead crane onto the tank hull for the grinding of the turret ring.

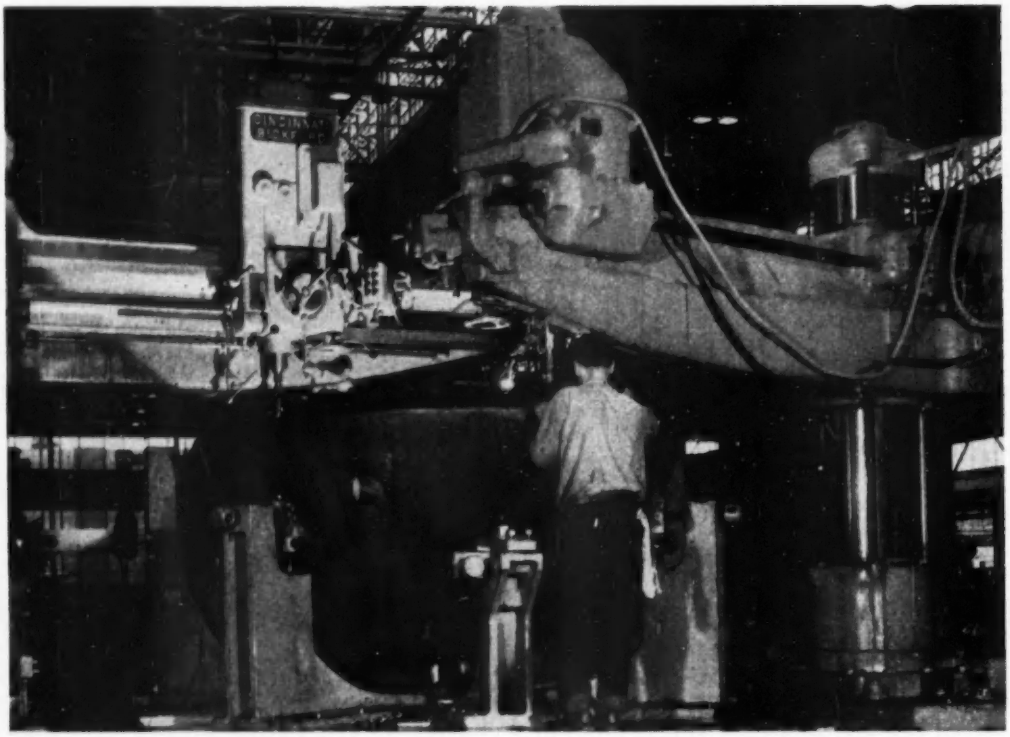
In the next bay the tank hull undergoes complete steam cleaning and degreasing operations. Once again the hull is moved automatically through the entire work cycle. This is accomplished by special cradle trucks attached to a drag chair conveyor.

Self-propelled machining fixtures also are used for all of the operations along the turret line. At the head of the line there are two Morton vertical mills installed. These perform operations on the ring on the bottom of the turret. Next in line are two Cincinnati Bickfords for drilling and tapping various holes in the turret. Another Morton profiler which has been installed at the next station finishes operations on the turret ring.

For various odd holes in the turret, a Kaukauna angular head drill is brought to play. The turret is then turned right side up and various metal removal procedures performed on the ends. Here, two Morton machine tools perform all of the necessary operations. Working simultaneously, these tools do



Drive mechanism under one of the self-propelled machining fixtures used on the hull line.



Turrets are mounted on special self-propelled fixtures of the type depicted above.

profiling and horizontal boring mill operations on the front and rear ends of the turret respectively. Then a Cincinnati Bickford and two Natco units mounted on special ways take over drilling and tapping.

The turret is next turned 90 deg so that certain work procedures can be done on the sides. Giddings & Lewis horizontal mills start off the line, followed by another Morton profiler. These tools are standard pieces of equipment mounted specifically for the operation involved. The tools are mounted on a trunnion with specially adapted hydraulic jacks for raising the tool to a five deg angle.

Succeeding operations include a Morton vertical boring mill, two Cincinnati Bickford radial arm drills, another Morton profiler, a Sellers mill, and a Mercury grinder.

General view of the new Budd tank plant

For grinding the hull turret ring, this portable Mercury grinder is brought to play. It is lifted by an overhead crane and set up on the top of the hull.

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Production Facilities and Equipment Needed for Heavy Press Program. Machinery Makers Cool Toward Reserve Buildup.

Needed—Tools for Press Program

The Defense Production Administration has the "help wanted" sign out for industry to take part in the program for building new production facilities for turning out the huge machine tools needed for the Government's heavy press program.

According to reports, about 450 general-purpose, precision machines are needed as soon as possible under present requirements. It is estimated that the size of the equipment will vary from 250,000 to 450,000 lb pr unit. When built, the machinery will be utilized mostly in building heavy forging and extrusion presses.

Construction of the necessary facilities will be over and above the recently announced expansion program for machine tools. This called for an additional investment by industry of $131 million in new capital equipment. The Government is somewhat vague concerning the extent of specific capacity needed for the bigger tools. However, it is learned that DPA is talking in terms of $50 million as a starter in connection with the program.

Industry, so far, is not clamoring to take part in this specialized expansion. To date, only machine tool builders have filed applications to take part in the program and become eligible for tax certificates and other assistance.

Tool Orders Drop

New orders for machine tools have declined sharply in October to an index figure of 243.7 from 302.4 the month previously. Orders during the month were the smallest since July, 1950, just after the Korean affair began. Industry opinion, however, is that the decline will be of short duration and will last only until tool requirements for defense orders are better defined. At the end of October the industry still had a backlog of a little more than 11 months production of unfilled orders. In September of 1951 the backlog stood at 23.5 months production.

Automaticity

The recent impetus of automatically controlled machine tools for the automatic factory has caused the Council for Technological Advancement to publish a report entitled, "Automatic Control and the Automatic Factory." As presently envisioned by the Council, the principal benefits of automatic control to our production will be less down-time of productive facilities since machines will be switched from one job to another without mechanical adjustments, less work in process will be spoiled, and production per worker will increase, which in the final analysis can raise the standard of living.

Tool Builders Wary Of Reserve Buildup

Machine tool producers generally are reported to be cool toward a Government proposal to buy and store complex machine tools to be used in case of all-out war. Under the proposal made by Defense Mobilizer Henry Fowler, nearly a billion dollars would be set aside for the purchase of machine tools with long lead time so that they would be available immediately for production of weapons in the event of an emergency.

Some machine tool builders question the ability of the Government to foresee exactly what tools would be required for future defense programs. Others, however, say that the program is justified if future use can be determined, but only on tools with a long lead time.

Another factor disturbing the machine tool people is the fear that a large inventory of tools would be a continuing threat to the industry, since they might eventually be dumped on the market if not needed for war production. They point out that after WW II, 120,000 machine tools were put in storage and that the market was disrupted when they were offered as Government surplus.

Bright Sales Picture Predicted by Importers

Importers are optimistic about the sales outlook for this year, according to George R. Vonderahe, vice president, American Association of Machinery Importers, and business manager, Kurt Orban Co., Inc., New York, N. Y. Mr. Vonderahe went on to say that recent publicity concerning the importation of foreign-made machine tools has led some people to believe that this is a new development. Actually, some of the same makes of tools presently imported by members of the AAMI have been known and used in American plants since well before the turn of the century, according to his statement.

CEMA Elects Officers

Harry C. Davis, general manager, Kanawha Mfg. Co., Charleston, W. Va., has been elected president of the Conveyor Equipment Manufacturers' Association.

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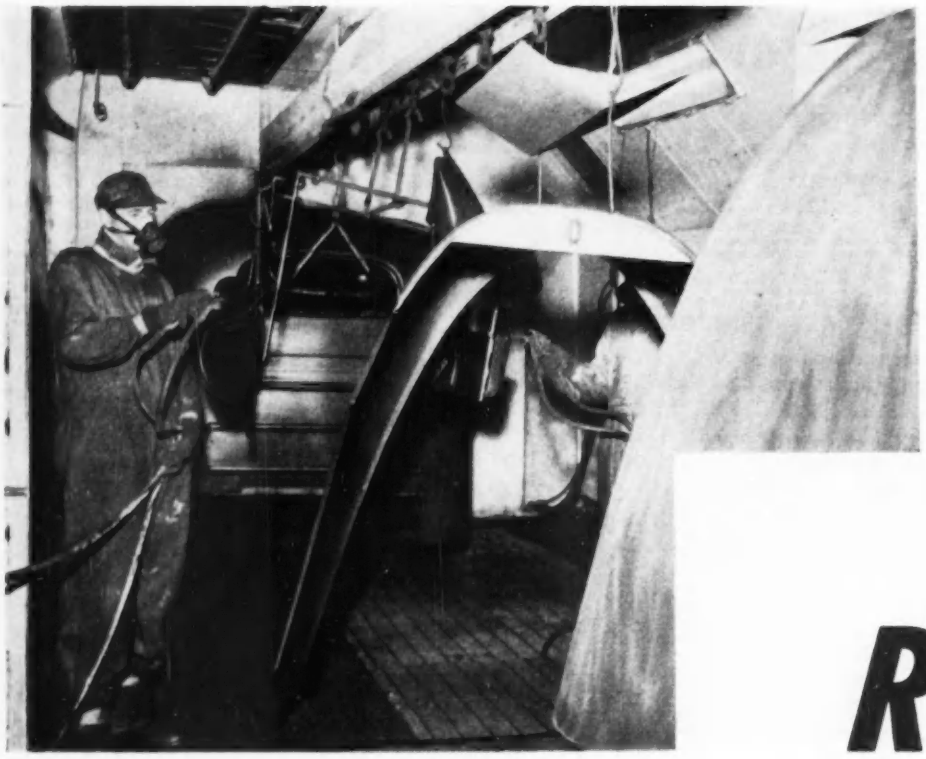


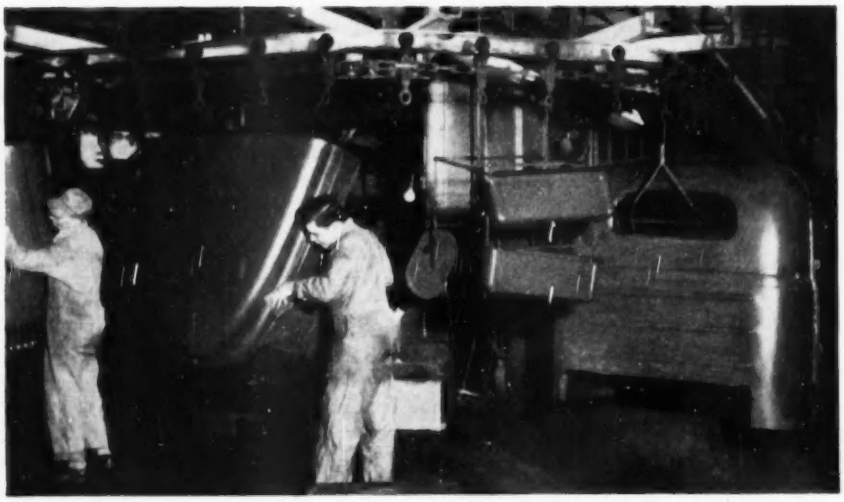
Color enamel is hot-sprayed on Reo sheet metal parts at a temperature of 160 F in Newcomb - Detroit paint booths.

REO

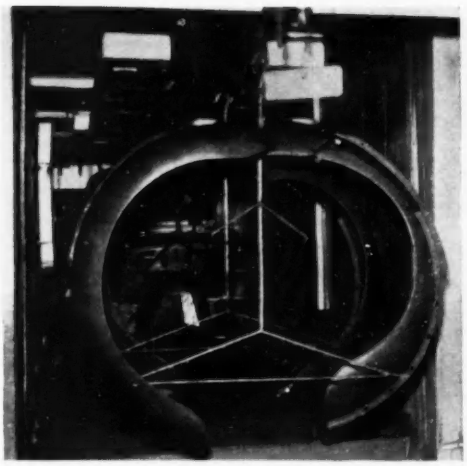
IT is a matter of outstanding interest that hot spray painting of sheet metal, introduced to industry a relatively short time ago, has been adopted as a standard practice by Reo Motors, Inc., in painting fenders, bumpers, cabs, hoods, etc. According to Reo, the hot spray method of applying synthetic enamel finishes has many important advantages over conventional methods. For one thing, it is said to assure more uniform control of paint application, making it possible to use a thicker coating—about 40 per cent thicker—while covering more evenly.

Despite the thicker and more uniform coating made possible by hot spraying, overall cost is said to be lower because there is less loss of paint through fog or overspray. Surfacers and color enamel are applied at a temperature of about 160 F, this operation being controlled by the installation of Bede hot spray equipment, using DeVilbiss spray guns. The enamels and other materials used in the process are passed through electrically heated aluminum coils and brought to the desired temperature. Bede heating equipment is mounted outside the spray booth as shown.

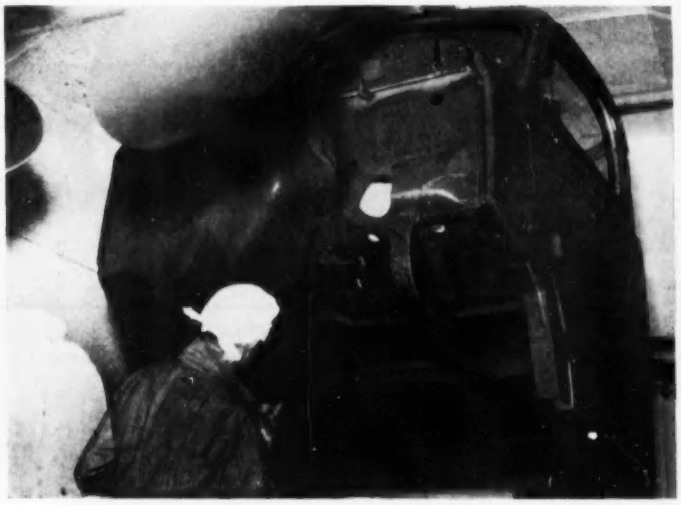
With hot spraying it is feasible to employ heavier and more viscous enamels containing less solvent than



Sheet metal is transported on the lengthy paint department conveyor through all stages of the new paint setup. At this location the primer coat is dry-sanded in preparation for the color coat.



Fenders are transported on the monorail conveyor while attached to the ingeniously designed bracket seen here. The conveyor takes them through the paint booth and into the Burdette gas-fired oven for baking at 265 to 285 F for 25 minutes.



Cabs, fenders, and hoods are sprayed with a heavy undercoating as the various parts move through the booth shown here.

Adopts Hot Spray Painting

usual but a higher percentage of solids, since at the high temperature the heavy material flows more readily and with greater fluidity. At the same time the heated material atomizes more easily, consequently requires less air pressure for spray gun operation. This characteristic accounts for the reduction in losses ordinarily due to spray fog.

In Reo practice sheet metal is given a coating of primer and two coats of color enamel. The sequence of operations developed in connection with hot spray procedures is as follows:

First step is the preparation of sheet metal for painting by treatment in a five-stage washer. This big unit was designed and built by Reo. Before entering the washer, parts are brushed with oleum spirits to remove pigmented drawing compounds.

In the first stage of the washing operation, parts are carried on the paint conveyor through a spray of hot alkaline cleaner solution. The amount of cleaner is automatically regulated by the latest type electronic dispenser, which dispenses alkaline cleaner into the washing solution in accordance with the soil condition encountered on the sheet metal parts. The second stage is a hot water rinse, followed by application of a hot iron phosphate coating.

In the fourth stage, the sheet metal is given a cold water rinse to remove excess salts. This is followed by the final stage, a hot rinse consisting of a dilute chromic

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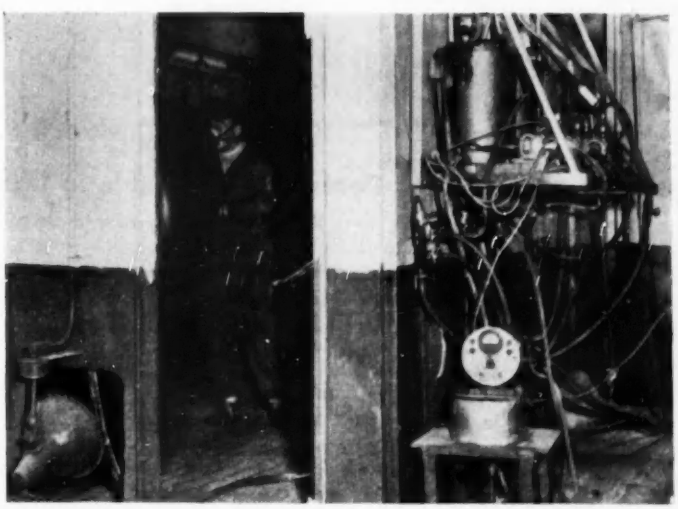
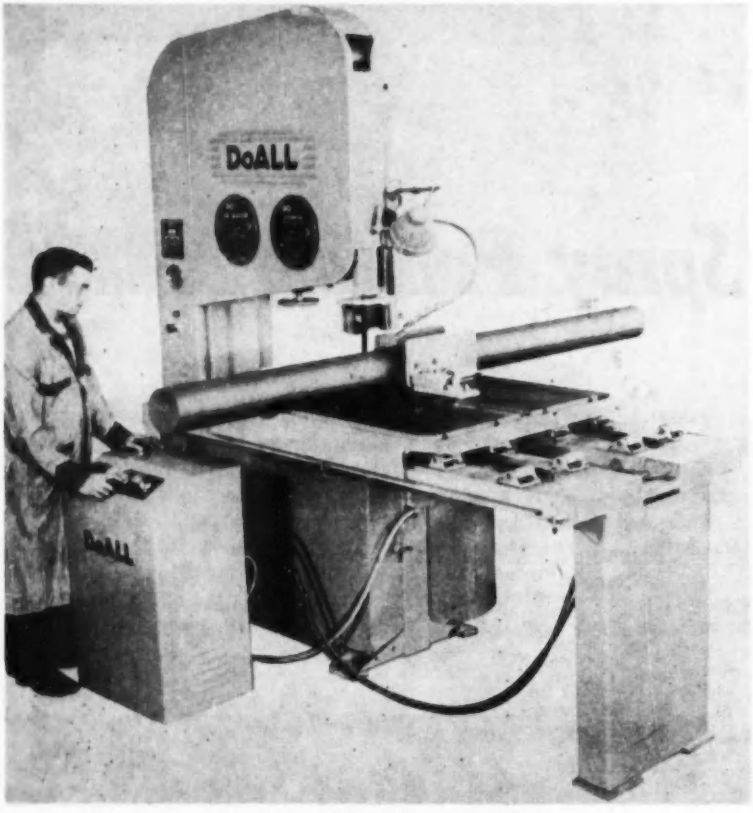


Exterior view of the spray booth showing the Bede paint heating equipment mounted outside. Synthetic enamel and other materials are pumped through aluminum coils, heated electrically and maintained at the proper temperature by sensitive controls.

NEW EQUIPMENT PLANT • PRODUCTION

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81

Band Sawing Machine for Heavy-Duty Service



DoAll heavy-duty band sawing machine.

A large capacity band sawing machine with wide speed range designed principally for rapid, heavy duty cut-off work is now in production. It will handle all kinds of ferrous or non-ferrous metals and all shapes including plate, structural, ingot, slab, pipe, extruded or rolled forms. Designated as the Zephyr Model CO-36, the saw blade of the machine is twisted 90 deg from conventional position at the work table so that the work is fed to the blade from the front of the machine.

Model CO-36 is readily convertible to conventional high or low speed, straight or contour sawing. The saw guides are simply changed to eliminate the twist from the blade and the table is moved into a "neutral" position.

It accommodates a 15½ in. work thickness under the saw guides and 9½ in. thickness at the column. The 40 in. by 48 in. work table is hydraulically powered and is capable of handling work up to 2000 lb in weight.

Wide tool speed range is provided by a three-speed transmission and a 10 hp Speedmaster variable speed drive. With this arrangement, any speed is obtainable from 40 to 10,000 fpm. *DoALL Co.*

Circle E-1 on page 81 for more data

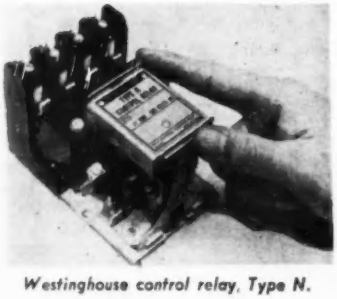
Control Relay Usable In Many Applications

Now on the market is a control relay, Type N, for the remote control of motors. It is used to sequence multimotor machines, to operate solenoids, or for the pilot control of electrical circuits from push-button stations, temperature or pressure controls, limit switches or other devices.

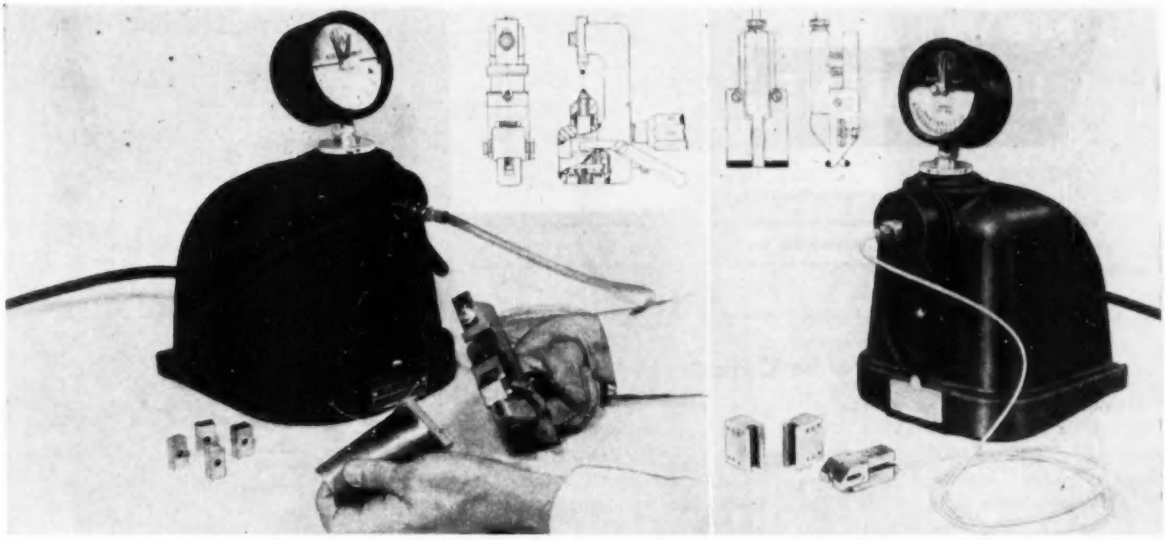
It is available in any combination of poles up to six, and in any combination of normally open or closed contacts. A cushion spring on the base plate is said to compensate for any irregularities on the mounting panel.

Other features include two specially hardened knife-edge bearings, a kick-out spring for rapid opening, and high, fine silver contact pressure. The relay is rated up to 600 v a-c with an open rating of 10 amp continuous or an enclosed rating of nine amp continuous. *Westinghouse Electric.*

Circle E-2 on page 81 for more data



Westinghouse control relay, Type N.



The P&W gage for checking blade roots is shown at the left while the blade carrier gage is illustrated at the right.

Air Gages for Jet Blade Inspection

Two gages claimed to greatly speed the checking of external and internal pitch diameters of the root forms on jet engine blades and blade carriers have been developed. Both units are used as hand gages in conjunction with a standard P&W Air-O-Limit Model "F" comparator.

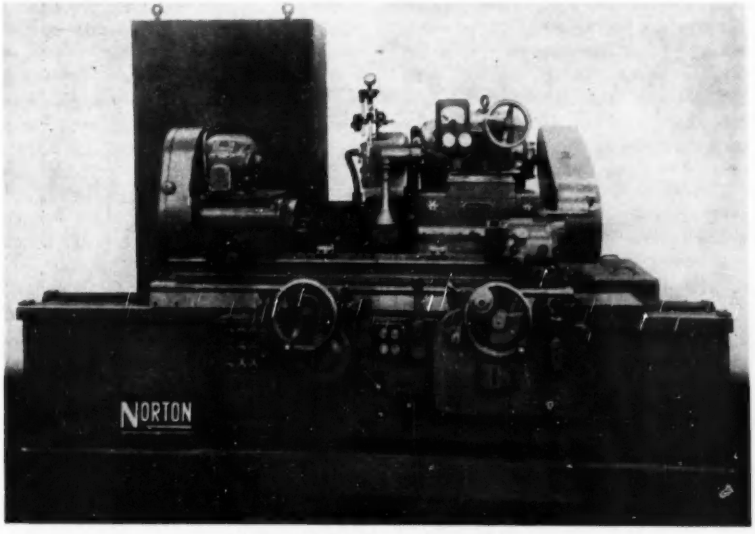
The blade root gage design incorporates a carbide roll-type anvil which is adjustable to accommodate various sizes of root forms. The gaging point, opposite the roll-type anvil is a carbide ball point spindle which operates the single air nozzle. A carbide roll pressure shoe spans the gage point and provides positive location of the gage on the blade root.

The carrier gage is designed to check the pitch diameter of the internal root forms in the jet engine blade carrier. Design of the gage incorporates a carbide roll-type anvil and carbide gaging roll. The carbide gaging roll is on a pivot arm which operates the single air nozzle. Both gages are set to minimum and maximum masters. *Pratt & Whitney Div., Niles-Bement-Pond Co.*

Circle E-3 on page 81 for more data

Plain or Semi-Automatic Machines for Cylindrical Grinding

Heavy-duty plain or semi-automatic cylindrical grinding machines, made in 18 in., 36 in., 48 in., or 72 in. work lengths, perform plunge-cut and traverse grinding operations that require larger diameter or wider grinding wheels than are accommodated by the conventional Type CTU grinders.



Norton cylindrical grinding machine.

Most important feature of the 10-in. Type CTU-HD and 14-in. Type LCTU-HD machines is the heavy wheel head with super-duty size pressure-lubricated wheel spindle for wheels up to 10-in. wide. Wheel feed is by a revolving feed screw type mechanism having a click-count index by which settings for 0.0001 in. work diameter reduction can be made.

A preset truing and grinding table speed arrangement permits presetting of speeds and selection thereafter of set speeds by movement of a combination table start-stop and selector lever. Work jogging control by means of a lever is an additional feature. It also has automatic control of work rotation and coolant flow. Automatic adjustable wheel feed at table reversals with automatic resetting of the wheel head and separate dwell controls for each end of table travel are also furnished. *Norton Co.*

Circle E-4 on page 81 for more data

(*Turn to page 76, please*)

NEW EQUIPMENT PLANT · PRODUCTION

For additional information, please use postage-free reply card on page 81

(*Continued from page 75*)

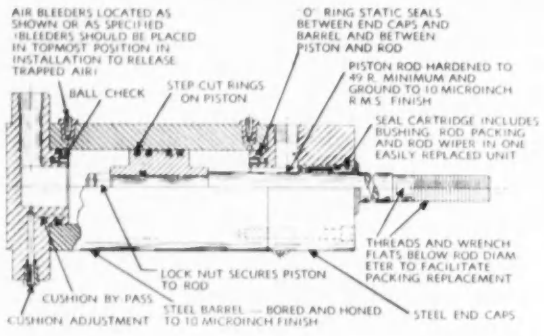
Hydraulic Cylinders

Recently announced is a line of hydraulic cylinders for working pressures up to 2000 psi (3000 psi in non-shock service). Identified as Series "J" cylinders, these units comply with J.I.C. specifications and feature all-steel bodies, bored barrels, hardened piston rods, rod scrapers and new cartridge type packings.

According to the manufacturer, the score-resistant, hardened piston rod and improved gland packing, protected by rod scrapers, assure longer service life for the series "J" cylinder. Barrels are bored before honing to insure precise piston ring fit for full length of stroke.

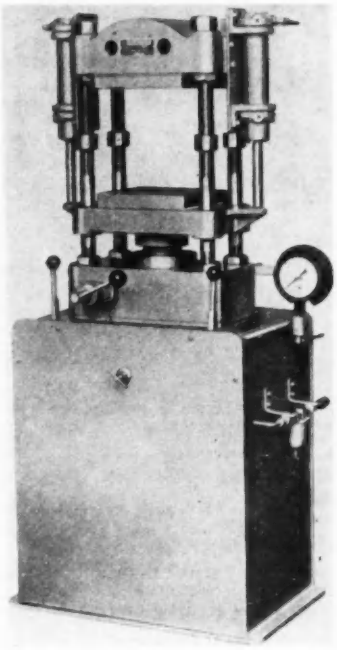
Series "J" cylinders are regularly available for oil or water hydraulic service in bore sizes up to 10 in. diam. *Hydro-Line Manufacturing Co.*

Circle E-5 on page 81 for more data


AIR BLEEDERS LOCATED AS SHOWN OR AS SPECIFIED (BLEEDERS SHOULD BE PLACED IN TOPMOST POSITION IN INSTALLATION TO RELEASE TRAPPED AIR)
BALL CHECK
STEP CUT RINGS ON PISTON
"O" RING STATIC SEALS BETWEEN END CAPS AND BARREL AND BETWEEN PISTON AND ROD
PISTON ROD HARDENED TO 49 R. MINIMUM AND GROUND TO 10 MICROINCH R.M.S. FINISH
SEAL CARTRIDGE INCLUDES BUSHING, ROD PACKING, AND ROD WIPER IN ONE EASILY REPLACED UNIT
THREADS AND WRENCH FLATS BELOW ROD DIAM. ETER TO FACILITATE PACKING REPLACEMENT
LOCK NUT SECURES PISTON TO ROD
CUSHION BY-PASS
CUSHION ADJUSTMENT
STEEL BARREL — BORED AND HONED TO 10 MICROINCH FINISH
STEEL END CAPS

Hydro-Line hydraulic cylinder.

Plastic Molding Press



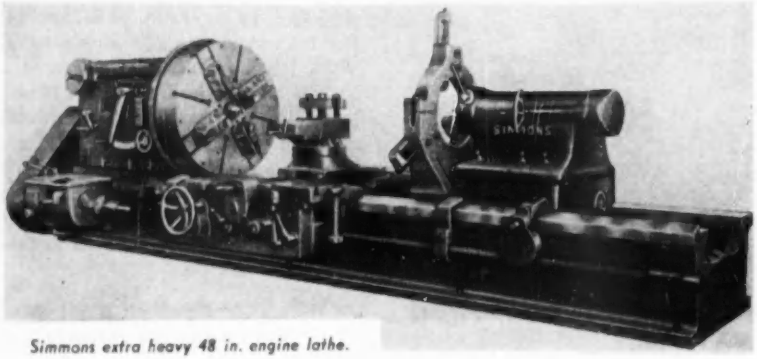
Hydrolairs, small, light-weight plastic molding presses, now incorporate a special modification of the standard design. The 30-ton capacity model illustrated is equipped with air-operated pushback cylinders for powered ram return. This press can be modified to meet a wide range of specific production requirements. Hydrolairs take their power from the shop air line and are said to be fast and full power-operated, with high-pressure stroke. Selected pressure is automatically applied and maintained. (Elmes Engineering Div., American Steel Foundries.)

Circle E-6 on page 81 for more data

48 In. Heavy-Duty Engine Lathe Redesigned

The Simmons extra heavy 48 in. engine lathe has been redesigned for more power and rigidity. Bed lengths run from 20 ft minimum up to any length required, by five-ft increments. The bed has an angular guide front way. Bed width is 46½ in. and there is now a continuous flange along the bottom for increased rigidity.

The headstock is completely anti-friction with precision dual Timken bearings on the spindle. A variable voltage drive provides a range of spindle speeds with three gear changes, two through internal face plate drive and one direct to spindle. Normal spindle speeds range from one to 144 rpm.



Simmons extra heavy 48 in. engine lathe.

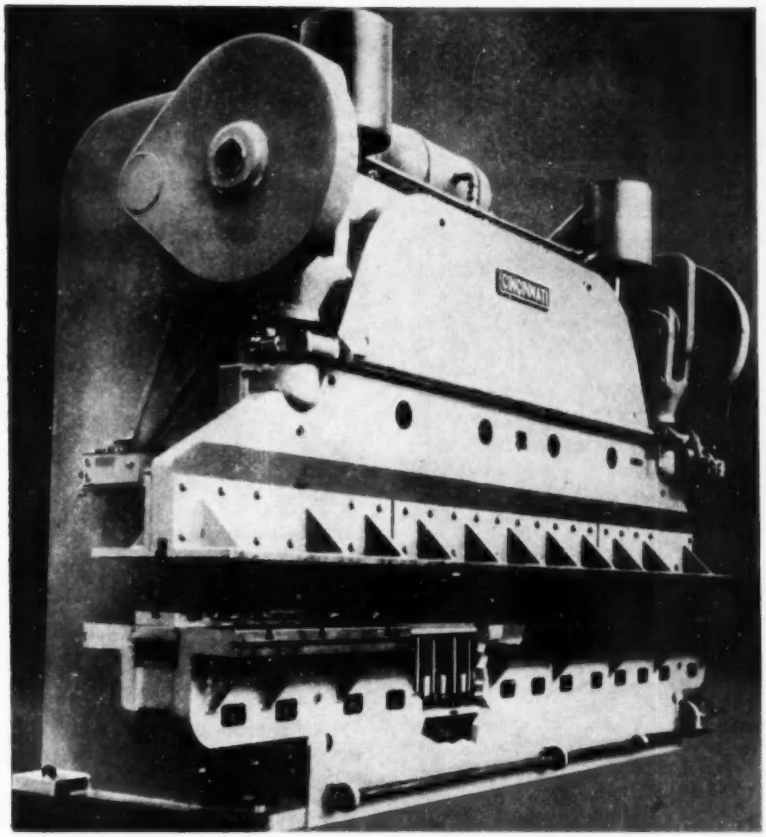
A completely new feed gear box provides threads ranging from one-half to 56 per inch. The lead screw is now 3½ in. diam.

Tailstock spindle has been increased to seven in. diam. All spindles are steel forgings, heat treated and turned and ground to size.

Standard equipment includes the following: thread cutting mechanism with indicator; compound rest with power cross and angular feed; No. 1 steady rest six in. to 18 in. diam; power rapid traverse to carriage; four-stud heavy duty tool post; forced feed lubrication to headstock and apron; apron control; headstock and tailstock center; motor base, drive sheaves and vee belt guards; operating crank handles and wrenches.

This improved lathe is also built in 54 in. and 60 in. swing and can be modified to meet special requirements. *Simmons Machine Tool Corp.*

Circle E-7 on page 81 for more data



Cincinnati press brake.

Press Brake

For shallow draw work as well as conventional press brake work, a recently developed press brake has a double plate bed, 30 in. wide, and 15 ft, eight in. in overall length. There are 14 six-in. air cylinders mounted between plates for operating draw rings, knockout bars, and similar units.

The machine weighs 72,000 lb, has a speed of 23 strokes per minute and has removable ram angles for press or brake operation.

Additional features include air counterbalances and horns on each end of the bed and ram. *Cincinnati Shaper Co.*

Circle E-8 on page 81 for more data

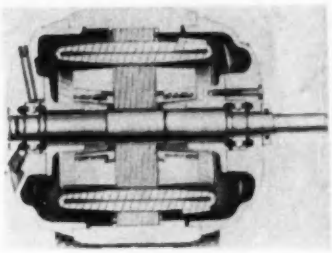
Totally-Enclosed Motors

A totally-enclosed motor, Type SS, has been developed for services where dampness, dust, fire hazards and corrosive fumes are prevalent. Because of its construction, Type SS is self-cooling. Type SS is provided with a slinger to protect the output shaft bearing against the entrance of dirt or water.

This motor, also available in Type SES, has been designed for explosion-proof service in hazardous locations. It has been approved by the Underwriters' Laboratories, Inc., and bears the official label.

These motors are available in a range from 1/3 to two hp and will later be produced in larger ratings. Complying to N.E.M.A. Standards, Types SS and SES have these additional features: modern exterior design; sealed terminal chamber; normalized castings; asbestos-protected windings; solid centricast rotor and an exclusive feature, Lubriflush bearings which provide an extra large lubricant chamber and provision for forcing the grease through the bearing for a thorough purge of the old grease when the motor is lubricated. *U. S. Electrical Motors, Inc.*

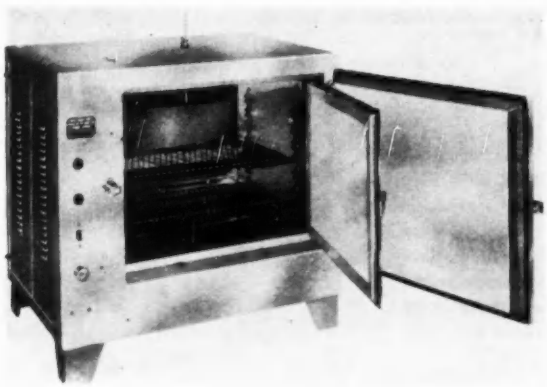
Circle E-9 on page 81 for more data



U. S. totally-enclosed motor.

Constant Temperature Humidity Cabinets

Any tests involving 90-100 per cent relative humidity at from 4C (39.2F) up to 70C (158F) dry bulb temperature may be made with a recently developed constant temperature humidity cabinet. Blue M counterflow baffle used in the unit is said to promote and maintain a direct, definite, and vigorous chamber atmosphere circulation while saying on cooling water when testing at temperatures below the ambient temperature.



Blue M constant temperature humidity cabinet.

The automatic hydraulic-electric thermostat for controlling temperature has a response sensitivity of plus or minus ½C. Interior and exterior of the unit is constructed of stainless steel. It is available in standard voltages. Wattage consumption is from 450 to 1250. *Blue M Electric Co.*

Circle E-10 on page 81 for more data

(*Turn to page 78, please*)

NEW EQUIPMENT PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 81

(*Continued from page 77*)

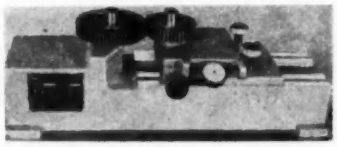
External Gear Rolling Fixture

Model 602 bench type rolling fixture for checking size, eccentricity and roll smoothness of spur and helical external gears has been brought out. The fixture features a heavy cast iron base, scraped ways and hardened and ground ball ways. It can be used in conjunction with the Michigan Model MTR-50 automatic recorder to place all readings on permanent charts.

The gear to be checked is loaded on a vertical arbor that is moved into mesh with the master gear by an eccentric lever control. Proper tension between gear and master gear is maintained by spring-loaded ball ways. Turning the gear manually causes a 0.0005-in. indicator to show size, eccentricity and smoothness variations.

Model 602 rolling fixture has a center distance adjustable from two to 10 in. The master gear arbor is one-in. OD. Arbors for gears to be checked are made to suit. The fixture is 9½-in. wide, 29-in. long and 7¼-in. high. *Michigan Tool Co.*

Circle E-11 on page 81 for more data



Michigan external gear rolling fixture.

Girth Welding Machine Incorporates Hydraulic Press

Morton press and girth welder.

Model E press and girth welder has been engineered to make fillet and burn-through circumferential welds. The main feature of this machine is a built-in five ton hydraulic press for the assembly of parts prior to welding. A two-pressure hydraulic system is incorporated with high pressure for assembly and low pressure for holding parts during welding.

A stationary headstock supports the center spindle drive and gives reaction to the press while the adjustable tailstock houses the hydraulic press cylinder. The press is under push button inching control, and the eject and reload cycle is automatic in operation. Manual longitudinal and radial positioning of the welding heads is provided to cover the machine range. *Morton Mfg. Co.*

Circle E-12 on page 81 for more data

Twin Barrel Finishing Machine

A twin barrel finishing machine that will handle steel burnishing balls in both barrels has been announced. It has a ball bearing variable speed drive. Power is furnished by a ¾-hp 220-v three-phase motor.

Standard barrels as furnished with this machine are 10¾ in. by 17 in. size. Barrels are attached by four bolts each, and are furnished either unlined or vinyl plastic lined with safety type cover which prevents pressure from building up in the barrels.

Standard equipment includes two tote boxes for emptying barrels and perforated covers to permit draining liquid from barrels. *Rampe Mfg. Co.*

Circle E-13 on page 81 for more data

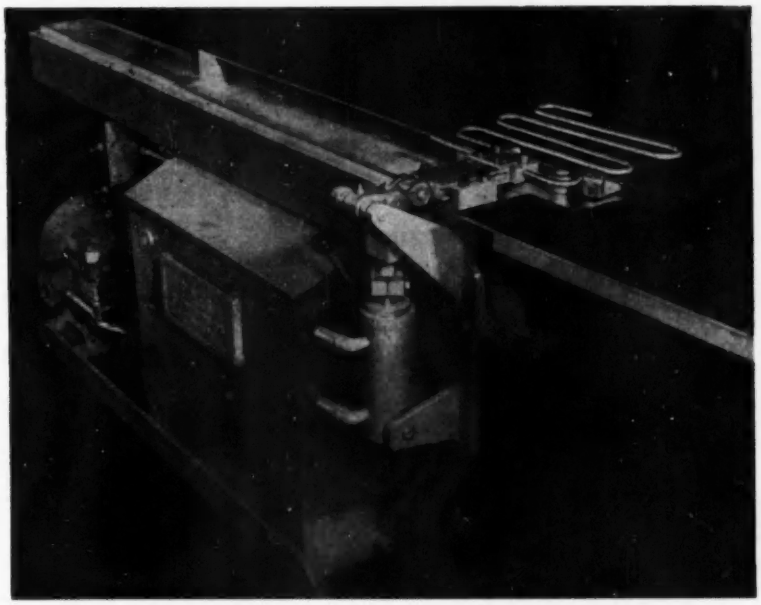
Rampe twin barrel finishing machine.

Semi-Automatic Bending Machine

Now in production is a semi-automatic bending machine for serpentine coil bending. It is equipped with a single control lever, a stationary bending form, a rotating wiping shoe, and a semi-circular table to maintain long coils in a horizontal position during the sweep of the bending cycle.

In bending continuous serpentine coils, the first bend is completed in a conventional manner, after which the stock is rotated 180 deg before clamping for succeeding bends. One movement of the operating lever initiates the entire clamping and bending cycle. The rotating wiping shoe is designed with a curved face and operates with a cam effect.

Production averages 450 bends per hour. This machine will handle tubing up to one in. OD, 16-gage, and five ft in length. Die height of machine from the floor is 35 in., and overall dimensions of the base of the unit is 74½ in. by 15 in. The unit is equipped with a Vickers self-contained power pack, which provides a bending speed of 29 rpm. A three hp motor is used, and pump delivery is seven gpm at 1000 psi. *Pines Engineering Co.*



Pines semi-automatic bender for serpentine coil bending.

Circle E-14 on page 81 for more data

All Steel Bending Rolls for Various Shapes

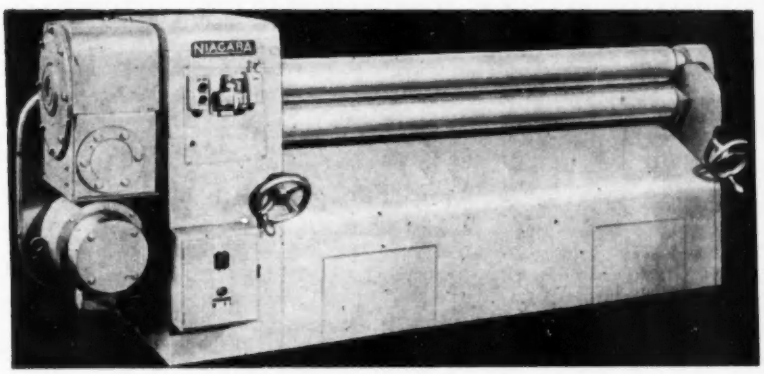
A series of all steel bending rolls has been announced as available. They are said to produce commercially true cylinders from thinnest sheets to maximum capacity and, in addition, can roll a multitude of bends in various shapes including oval forms, rectangular pipes, rounded end containers and cones.

Rolls are of the pinch type construction. As all three rolls are power driven, light gage sheets can be readily formed into small diameters.

An air operated drop end is controlled by a two position valve. The upper roll automatically tilts for removal of the rolled cylinder.

Power adjustment for the rear roll permits moving the roll to proper position for producing any desired radius of curvature. Roll position indicators permit duplication of roll setting or repeat jobs.

A magnetic brake is provided on the main motor. The rolls are made in three sizes, with capacities 5/16 in. by 48 in., 3/16 in. by 72 in. and 12 gage by 120 in. *Niagara Machine & Tool Works.*



Niagara all steel bending rolls.

Circle E-15 on page 81 for more data

High-Pressure Two-In. Control Valve

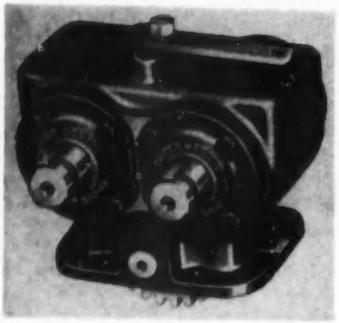
An addition, a two-in. model, to a line of hydraulic relief, sequence, and unloading valves, designed for high-pressure, high-volume circuits, has been announced. This two-in. HydrOILic relief valve is built to provide pressure control up to 5000 psi, with volume capacities up to 125 gpm. It is claimed to feature low differential between opening and closing pressures.

Greater efficiency, resulting in better circuit operation, is said to be made possible by the extremely close fit of all sealing surfaces within the valve body. Pressure setting is adjusted by a knurled screw on the valve cap. Provision is also made for remote control of this regulation. This valve is furnished with either threaded body or for subplate mounting. *Denison Engineering Co.*

Circle E-16 on page 81 for more data

NEW PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 81



Dual-Capacity Power Take-off

Recently announced is the Model K Brown-Lipe power take-off, said to feature a dual output capacity with two drive shafts that permit operating separate units at different intervals. It is claimed that such simultaneous jobs as operating gasoline and fuel oil pumps, winches and posthole diggers, etc., can be handled.

Additional important features include: heavy-duty construction; shafts or gears mounted on tapered roller bearings; and continuous or intermittent operation. Both shafts reportedly may be assembled to the front or rear, or one to the front and the other to the rear. By changing input gear only, unit may be adapted to other transmissions.

The Model K is for use with spur gear applications, and its companion Model KN for helical gear use. *Spicer Manufacturing Div., Dana Corp.*

Circle P-5 on page 81 for more data

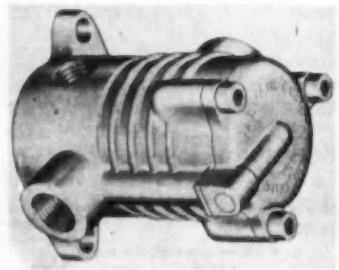
Performance Test Instrument

Known as the PerfOMeter, a self-contained instrument now available is said to measure important factors in the operation of cars and trucks.

The instrument, a combined accelerometer, decelerometer, and gradient indicator, utilizes the action of a simple pendulum that is dampened by baffles in oil, completely sealed hermetically. It is claimed to reflect the effects of gravity, momentum, and drag through a gearing arrangement. Full compensation is provided for climatic and altitude variations by a spring-loaded valve venting the instrument to atmospheric pressure.

The seven-scale device is accurately calibrated to measure pulling power in pounds per ton in all gears, showing level-road power and hill climbing ability, as well as tractive and engine resistance. The instrument measures braking efficiency in percentage and in distance required for stops. *Autosphere Corp.*

Circle P-6 on page 81 for more data



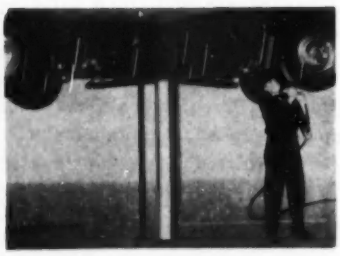
Solenoid Pilot Valve

Currently available is a solenoid pilot valve which measures three in. in height. It handles air, vacuum, oil, water, and inert gases.

The body and cover are of high tensile zinc base alloy. The standard coil is said to be adaptable to either continuous or intermittent service. The coil is sealed from but cooled by the fluid or air passing through the valve. There are only two moving parts—plunger and stem.

Models include two-way and three-way either normally open or normally closed. The following orifice sizes are available: 1/16 in., 3/32 in. and ⅛ in. with ¼ in. pipe tap. *Valvair Corp.*

Circle P-7 on page 81 for more data



Single-Post Automobile Lift

Recently announced is a single-post automobile lift which is said to feature good under-car accessibility and quick car spotting.

It is claimed that with the X-Master lift all under parts of automobiles are accessible and that chassis are completely relaxed for better lubrication. The lift reportedly accommodates more than 90 per cent of all automobiles on the same setting of the frame contacts. Other settings are quickly made for cars with special frames. *Joyce-Cridland Co.*

Circle P-8 on page 81 for more data

(*Turn to page* 130, *please*)

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

USE THIS POSTCARD

FREE LITERATURE

Aluminum Foil Packaging

An illustrated booklet ready for distribution describes advantages of protective packaging with plain aluminum foil and outlines various types. Stress is laid on military applications. *Reynolds Metals Co.*

Circle L-1 on postcard for free copy

Corrosion Preventives

Currently available is a descriptive brochure on the Klad Kote line of corrosion preventives. Included is a complete table of specifications for each type of compound. *Industrial Aviation Chemicals Div., R. M. Hollingshead Corp.*

Circle L-2 on postcard for free copy

Defense Production

Unfolded in a 28-page booklet entitled "Defense . . . Our Job Today" is a picture story of the manufacturer's line of machine tools at work on various military items. *The Heald Machine Co.*

Circle L-3 on postcard for free copy

Metals Line

Currently available is a 12-page catalog (No. PR700) which describes various composite metals, precious metals, electrical contacts, and Truflex metals. *General Plate Div., Metals & Controls Corp.*

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Production Analysis

Recently issued is a series of booklets on the production facilities of the company's seven major manufacturing divisions. The booklets contain reports on current products, war experience, and available facilities. *Military Relations Div., Willys-Overland Motors, Inc.*

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Metal Surface Preparations

Now available is a booklet which provides a general outline of a group of products designed to meet particular problems in preparing metal surfaces for finishing. *Northwest Chemical Co.*

Circle L-6 on postcard for free copy

Tool Bits

Recently published is an eight-page brochure which lists and illustrates the Hercules line of carbide and high speed tool bits. *Whitman & Barnes.*

Circle L-7 on postcard for free copy

Dieing Machines

Catalog No. 53 covers a line of dieing machines. Complete specifications on machines of 25-ton to 400-ton capacity inclusive are given. *Henry & Wright Div., Emhart Manufacturing Co.*

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(Please turn page)

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L-1	L-7	L-13	L-19	E-1	E-7	E-13	E-19	P-1	P-7	P-13	P-19	P-25
L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
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Protective Coatings

Described in a recently released brochure are transparent strippable protective coatings in general with emphasis on their uses and the elements which go into their formulations. *Tennessee Eastman Co. Div., Eastman Kodak Co.*

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Measuring Equipment

Now available is a 24-page catalog of Profilometer equipment for shop measurement of surface roughness. *Micrometrical Manufacturing Co.*

Circle L-10 on postcard for free copy

Hot Dip Formula

Now available is a brochure on a hot dip transparent coating for protecting all metal items. Three types of formulas are available. *Seal-Peel, Inc.*

Circle L-11 on postcard for free copy

Metal Cleaning

An illustrated brochure recently released describes Di-Phase and spray metal cleaning processes and accompanying washing equipment. *Solvent-tol Chemical Products, Inc.*

Circle L-12 on postcard for free copy

X-Ray Gage

Recently announced is a bulletin (No. MY-52-3) on the "50" Series Measuray for continuous or intermittent measurement of strip or sheet stock. *The Sheffield Corp.*

Circle L-13 on postcard for free copy

USE THIS POSTCARD

Diesel Engine

Recently published is a bulletin (Form 10027) on the TS Diesel engine. *Ingersoll-Rand Co.*

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Screw Calculator

An easy-vision screw calculator recently announced enables the user to obtain quickly all dimensions for a standard screw of given diameter. Vital data on threaded items in the Unbrako product line are also given. *Standard Pressed Steel Co.*

Circle L-15 on postcard for free copy

Machining Units

Bulletin No. 150-C is a handy reference on single-cycle handling of multiple and sequence machining operations. Descriptions of typical production-unit applications are included. *Barnes Drill Co.*

Circle L-16 on postcard for free copy

Tool Steel Data

Recently published is a booklet of reference tables useful to tool engineers, metallurgists, and others. Featured in the eight-page booklet is a temperature conversion table. *A. Milne & Co.*

Circle L-17 on postcard for free copy

Cold Cleaners

Now available is a four-page leaflet describing Houghto-Clean 439 and 440 cold cleaners for use at room temperature in power washers. The cleaners are said to remove soil from ferrous metals, copper, and brass. *E. F. Houghton & Co.*

Circle L-18 on postcard for free copy

Engine Lubrication

Vol. 38, No. 11 of "Lubrication" contains a comprehensive and informative article on problems associated with the lubrication of large engines. *The Texas Co.*

Circle L-19 on postcard for free copy

Roller Bearings

Catalog No. 522 contains complete descriptions and specifications for the selection of bearings for the materials handling, automotive, agricultural machinery, and transportation industries. *Berliss Bearing Co.*

Circle L-20 on postcard for free copy

Cutters

Catalog No. 52-A covers a line of routing and milling cutters for the non-ferrous metalworking industries. Included are a wide range of cutters required by the aircraft industry. *Onsrud Cutter Manufacturing Co.*

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(*See preceding page*)

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L-2	L-8	L-14	L-20	E-2	E-8	E-14	E-20	P-2	P-8	P-14	P-20	P-26
L-3	L-9	L-15	L-21	E-3	E-9	E-15	E-21	P-3	P-9	P-15	P-21	P-27
L-4	L-10	L-16	L-22	E-4	E-10	E-16	E-22	P-4	P-10	P-16	P-22	P-28
L-5	L-11	L-17	L-23	E-5	E-11	E-17	E-23	P-5	P-11	P-17	P-23	P-29
L-6	L-12	L-18	L-24	E-6	E-12	E-18	E-24	P-6	P-12	P-18	P-24	P-30

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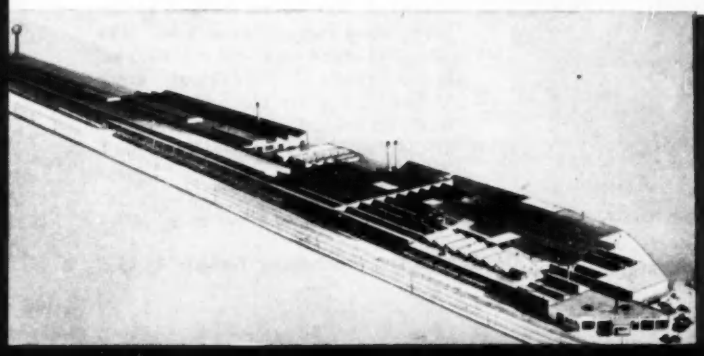
There is hardly a big name in the broad automotive industry that we have not served with Schwitzer-Cummins products.

We started more than a generation ago with the leading automobile companies of that time. New names in the automotive industry have constantly come to us since, stayed with us and we grew together to leadership. Today we are suppliers to many giants in our industry and even to whole divisions within it. Our facilities have continuously expanded to meet the growing demand for our products and to permit the large volume we enjoy today.

Why is this of interest to you? Because it so clearly demonstrates the superiority of Schwitzer-Cummins products and our ability to serve satisfactorily an ever-increasing number of automotive customers, large and small, newcomers and old-timers. So why not you?



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NEW AIRCRAFT PRODUCTS

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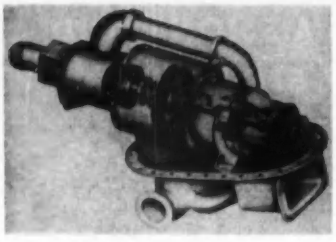
Jet Fuel Pump

Recently announced is a tank-mounted turbo-pump for supplying the extra supply of fuel which jet engines require for reheat operation. Driven by high-pressure air from the jet engine's compressor, the pump is said to combine boost, high pressure, and vapor separator elements in one package.



GE jet fuel pump.

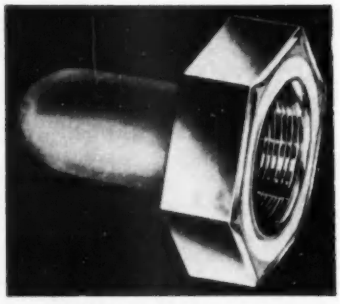
The pump is designed around the dual-rotor system which involves two separate turbine wheels with no mechanical interconnection. One turbine drives the vapor separator and the low pressure boost pump, and the other turbine drives the high pressure pump element.

There is no mechanical connection with the engine. Only a pneumatic connection is needed, thus leaving an engine-driven gear pad available for other service.

The pump is turned on or off automatically whenever the afterburner is needed, even while the engine is operating. It delivers approximately 86 gal of fuel per minute at a pressure rise of 510 psi.

Cooling is accomplished internally by both fuel and air. The air is drawn into double-walled sections of the pump by a built-in ejector, thus eliminating the need for ram air. The fuel itself is said to provide the necessary lubrication. *Aircraft Gas Turbine Div., General Electric Co.*

Circle P-1 on page 81 for more data



APM toggle switch boot.

Toggle Switch Boot

Now available is a boot that is said to be a high pressure seal for standard toggle switches. It is of single unit construction and is claimed to require no special assembly. The silastic material used in the boot is said to operate in the temperature range of—80 F to 500 F and to be impervious to salt water, acids, and ozone. *Automatic and Precision Mfg. Co.*

Circle P-2 on page 81 for more data

Self-Aligning Ball Bearing

Recently developed is an adaptation of the AN202 KP-B Type control bearing series. Designated as the KP-BS series, this self-aligning ball bearing is intended to accommodate aircraft structural deflections, manufacturing errors, differential expansion and contraction.

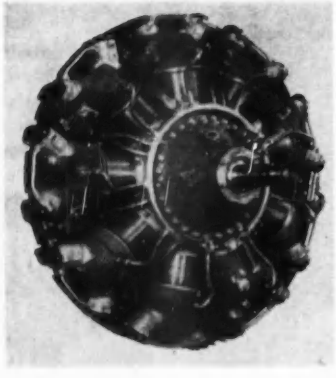
A mated self-aligning outer ring on the bearing is said to eliminate the necessity for extra parts previously required to achieve necessary alignment of the bearing in its housing.

The close fit between the bearing and the ring reportedly insures rigidity throughout the "push-pull" system. *The Fafnir Bearing Co.*

Circle P-3 on page 81 for more data

Radial Engine for Helicopters

Now in production is an improved version of the Continental R975 radial aircraft engine. Designed to meet the sustained high speed and high power output requirements imposed by latest helicopter applications, it is being made for quantity use in the Piasecki HUP-2.

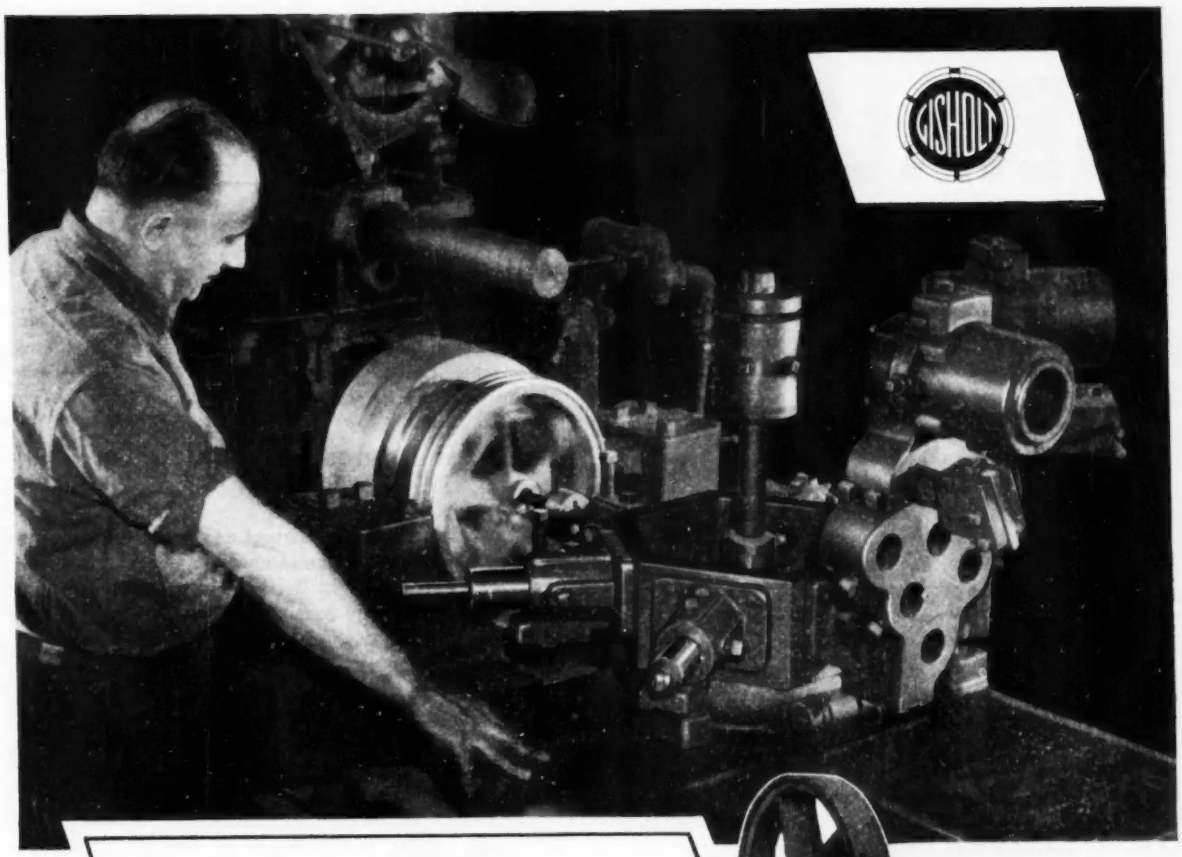


Continental Model R975-42 engine.

The new Model R975-42 is said to develop 550 hp, as compared with 525 hp for the earlier R975-34. Dry weight, exclusive of mounts but including carburetor, air deflectors, and ignition and priming systems, is 732 lb.

The new model has reportedly been also internally re-designed to permit use of a very small amount of flywheel when fan cooling is used. The manufacturer claims that it is adapted to installation in various types of helicopters. By the addition of a small amount of external equipment, it will run in any attitude from horizontal to full nose-up vertical. *Continental Aviation & Engineering Corp.*

Circle P-4 on page 81 for more data



Production Trebled by the *FASTERMATIC!*

Rough Casting

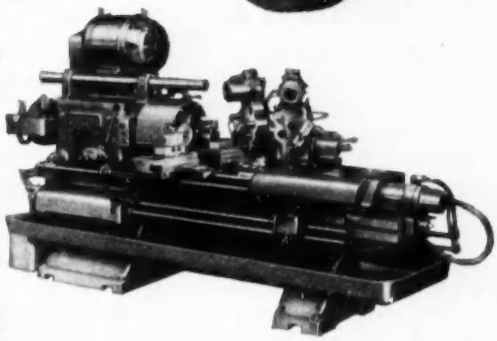
Finished Sheave

Note here the rather simple tooling arrangement for machining cast iron sheaves. This setup, similar to regular turret lathe work, is made just as easily. But here, the machine performs 15 different operations—holds tolerances consistently—completes the entire machining job in 13 minutes. The former time was 39 minutes.

Completely Automatic Cycle

It's the swift, automatic cycle of the Fastermatic that accounts for such substantial time savings. With its hydraulic feed system and automatic speed control, the operator has only to load the chuck, start the machine and remove the finished work. Usually, the operator has time to tend a second machine.

Now, when you need still greater production, it is a good time to look into the Fastermatics. Write for the Fastermatic catalog.



THE GISHOLT ROUND TABLE *represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.*

The Fastermatics are universal automatic turret lathes. Designed for accurate, high production turning, they can also be economically used on comparatively small lot work.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

METALS

Stocks of Steel Scrap Are Far Higher Than a Year Ago. Power Cuts Will Reduce Aluminum Output 25 Per Cent

By William F. Boericke

Continued Record Demand for Steel

Steel men are optimistic over the outlook for at least the first quarter of 1953 and some raise their sights to include the second quarter as well. As 1952 closes, steel users are still looking for all tonnage possible with early delivery desired. Capacity operations have prevailed in the last quarter of the year. The record production has been taken easily with special demand for larger sizes of plates, bars, and structural shapes. Warehouse business has been excellent.

A preliminary estimate of production of ingot steel in 1952 is 93,300,000 tons. Had the steel strike not intervened with its loss of 19 million tons, output would have been substantially more than in 1951. The increase in capacity in 1952 has been huge. More than 7,250,000 net tons of new ingot capacity was added which brings the year-end total capacity to 116 million tons. Early in 1953 the industry's goal of 120 million tons will have been attained.

This immense increase gives weight to the industry's plea for decontrol of steel at an early date. Many steel executives want to see decontrol come at once. It is pointed out that only 14 million tons of steel are needed for military and atomic projects as now planned, which leaves about 104 million tons for industry or 30 per cent more than the 80 million tons available for non-defense use in 1952.

Can We Use It All?

Sober consideration of the industry's 120 million ton capacity raises the question of consumers' ability to take all this output. There is little doubt that under Government pressure and aided by accelerated amortization of capital expenditures, steel capacity has been expanded at a rate far above normal. It is generally believed that all demands of industry could be filled by an operating rate of about 85 per cent instead of the current 106 per cent of capacity.

While this is generally acknowledged, it has not alarmed steel executives who believe their industry could operate about as profitably at a lower rate by eliminating the obsolete and inefficient equipment now needed to bring up output to its present over-capacity rate. If this proves to be the case, the fear is minimized that any decline in demand will lead to vicious price cutting in the price of steel products.

Stocks of steel scrap are far higher than they were a year ago when a nation-wide drive sponsored by every steel producer was on to bring in more supplies. Scrap supplies are now estimated to be over 7 million tons. Similarly, stockpiles of iron ore are at a satisfactory level in spite of the tie-up in shipping during the strike. Larger stocks of both are needed because of the increase in steel making capacity.

Insistent Domestic Demand for Copper

Copper demand is as insistent as ever in this country as the year ends but demand abroad appears less pressing. A tip-off is seen in Britain's relaxing the ban on use of copper in many consumers' goods. The Ministry of Materials has withdrawn restrictions on forward purchasing of copper and at the same time the Ministry announced a reduction in its buying price for blister copper from 29.4 cents to 25 cents per lb.

Copper fabricators got 136,800 tons of metal in October from producers and shipped 125,300 tons to their customers. This led to an increase in fabricators' stocks to 311,600 tons, a substantial increase over the low mark in May of 240,800 tons. Producers' stocks, on the other hand, fell to 59,700 tons at the end of October, a reduction of 24,000 tons since August.

Decontrol of copper is unlikely until later in 1953 despite urgent pleas by many industry representatives. Washington is opposed to early decontrol because of the virtual certainty of a domestic price increase if controls were lifted. While the price situation is admittedly most unsatisfactory, with a 50 per cent spread between markets here and abroad, there is no gain saying that the domestic copper consumers are able to get the cheapest metal in the world today under the Government's bitterly criticized allocation method.

In the extremely unlikely event that the world copper market would soften below the 24½ cent domestic ceiling, practically all the new copper due to come on the market in 1953 and in the following years would automatically go into the Government stockpile at guaranteed prices. Knowledge of this fact would in itself tend to stabilize the price.

Zinc Outlook Improved

Zinc statistics for November were surprisingly favorable and indicated a marked improvement in the metal's position. Shipments of slab to domestic customers rose sharply from 71,659 tons in October to 81,439 tons in November while total shipments, including exports and Government purchases, amounted to 90,700 tons, the highest monthly total for 1952. Coupled with this was a 12,000-ton decrease in metal stocks held by zinc producers which brought the total

(*Turn to page 132, please*)

The facts behind the facts at Perfect Circle

Chrome Plated Steel Compression Rings —Pioneered by PC—Offer Greatly Increased Resistance to Breakage

Behind this statement lies the story of a decade of research, testing and development...of trial and error, and finally of trial and success.

During World War II Perfect Circle engineers, working with the Air Corps, first developed practical production processes for making chrome-plated steel compression rings. The ultimate high output aircraft engine achievements might not have been realized without experience gained in PC's experimental production unit.

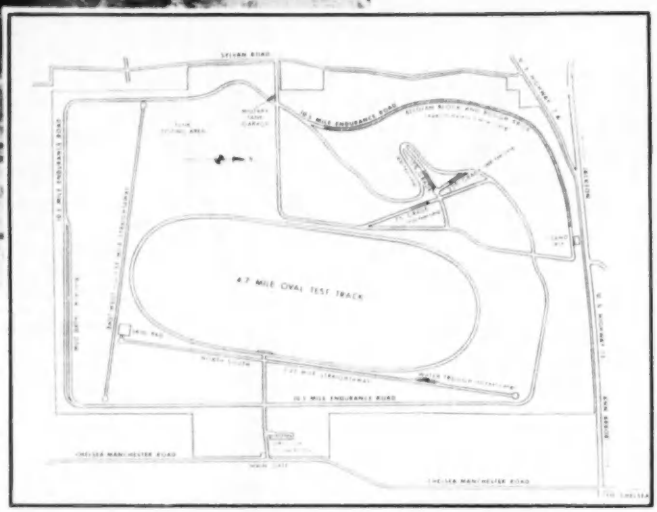
Today, refined and improved PC Chrome Plated Steel Compression Rings are indispensable in many heavy-duty installations. Features of these special purpose rings are: greater resistance to breakage; higher unit pressure and conformability than obtained with cast materials; good heat stability.

Perfect Circle PISTON RINGS

The Standard of Comparison

Perfect Circle Corporation, Hagerstown, Indiana;
The Perfect Circle Co., Ltd., Toronto, Ontario.

Machinery cuts hillside down to grade level at northwest curve of high speed oval test track. For the network of 45 miles of test roads and tracks under construction throughout the 3800-acre proving grounds, more than two million sq yd of earth must be moved in what is said to be the largest earth-moving contract ever let in the State of Michigan.



General layout of Chrysler Engineering Proving Grounds.

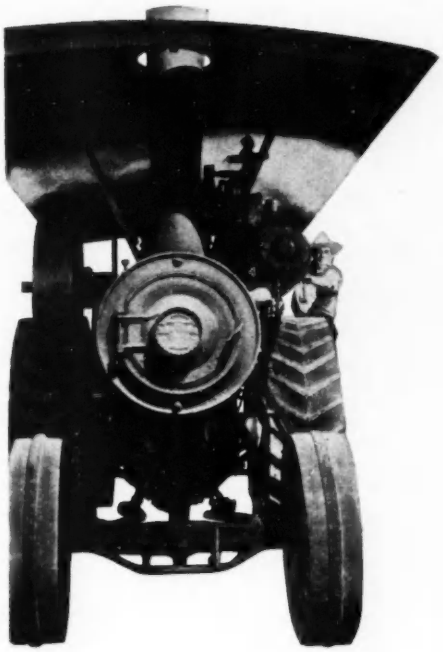
Chrysler Proving Grounds Will Be World's Largest

THE 3800-acre Chrysler Engineering Proving Grounds, largest of its kind in the world, will provide centrally located, modern facilities for all kinds of experimental testing of passenger cars, civilian and military trucks, and Army tanks. Designed as an extension of the Chrysler engineering laboratories, the proving grounds will supplement the company's program of road testing. It is presently under construction about two miles south of Chelsea, Mich., approximately 60 miles west of Detroit and midway between Ann Arbor and Jackson, Mich.

When completed, the Chrysler proving grounds will have 45 miles of test roads and tracks with various types of surfaces, including water trough, mud pit, sand pit, steep inclines, a 10.5-mile gravel endurance road, two long concrete straightaway tracks and a 4.7-mile high speed oval test track of concrete surface built for speeds up to 140 mph without side thrust.

The concrete straightaway tracks are 24 ft wide with turnaround pads at each end 80 ft in diameter. A skid pad 300 ft square is also planned. The oval test track is to have four high speed lanes and one low speed lane. Paving will be completed next Fall. Other driving conditions will be provided for by a water trough 100 ft long, a concrete-lined mud trough for controlled consistency, a sand pit, and rough asphalt and Belgian block surfaces.

Each year the Chrysler Corp. Engineering Div. road-tests passenger cars and trucks a total of more than three million miles. Part of this experimental road testing work is now being done on the proving grounds property. Already in use is a large experimental garage and office building 60,000 sq ft in area, as well as a large quonset type military tank garage.

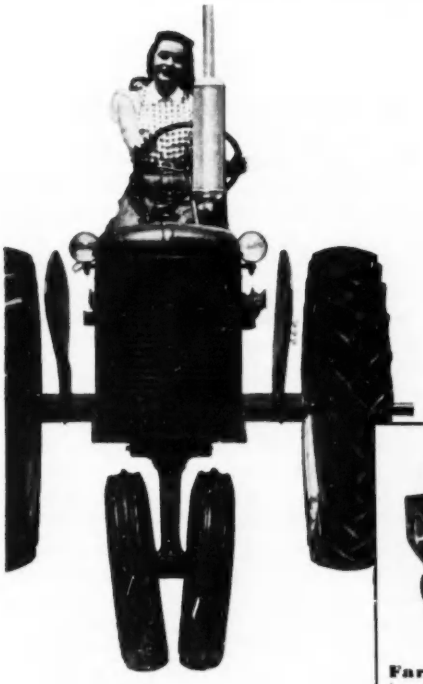


FARMERS expect more from tractors than ever before. They must be economical to operate . . . and above all, dependable. Tractors need water pumps and fuel pumps that will assure uninterrupted performance, especially at planting and harvest times. Hydraulic pumps to actuate tractor implements are of equal importance.

These pumps are among the many things that have been engineered and are being precision built by Thompson for the automotive and aircraft industries.

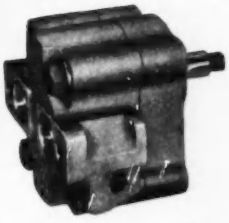
All the techniques and skills gained in making unbelievably complex items, many made to the closest

Pump Performance you can take for granted!



tolerances, are applied to Thompson pumps. This means that every one assures maximum performance and dependability.

If you need pumps to cool your engines, to raise and lower your farm implements or industrial pumps to keep your product cooled, write or phone *Special Products Division, Thompson Products, Inc., 2196 Clarkwood Road, Cleveland 3, Ohio.*



Farm Implement Pump.
Let Thompson's Special Products Division work with you on your hydraulic pump problems.

You can coup

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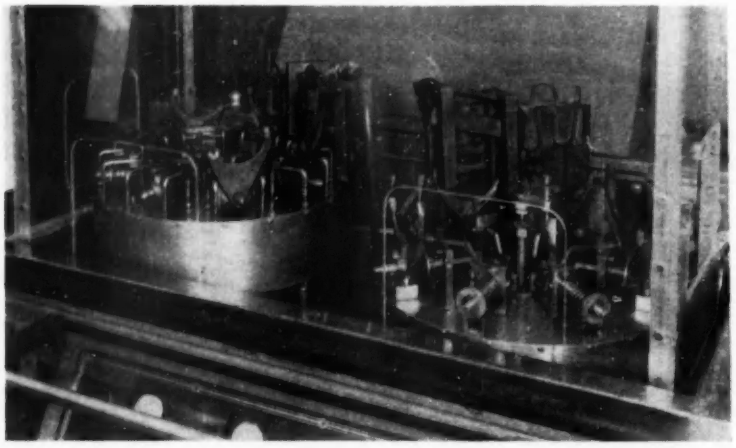
SPECIAL PRODUCTS DIVISION

By Arthur A. Lyness, Jr.

Design Engineer
Electronics Division
Westinghouse Electric Corp.



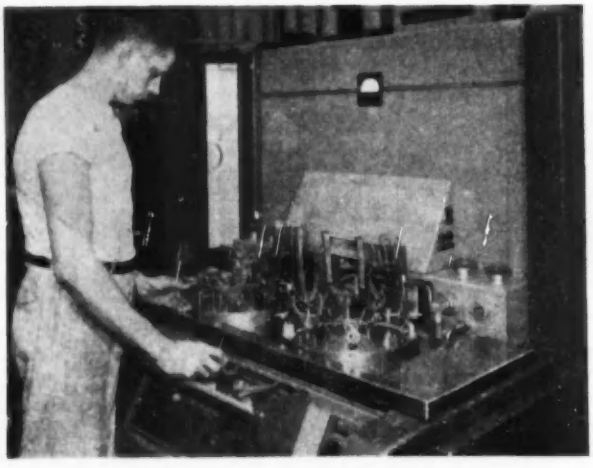
Machine set up for operation. Left hand table is in the up position with shifter fork in the heating coil. Forks on right hand table are waiting to be heated. Note load and eject openings in splash shield.

Automatic Induction Hardening

of Transmission Shifter Forks

A LARGE automobile manufacturer* solved a heat treating problem with regard to transmission shifter forks by the use of localized induction hardening. There are two shifter forks in each automatic transmission and two more in each manual transmission. Thus the processing of four different shifter forks is required. The automatic induction hardening shifter fork machine as installed is capable of selective hardening better than 7500 finished shifter forks of all types, per 16-hr day, which is approximately 35 per cent more than is required.

Here is the machine in production without splash shield in place.



Prior to the installation of this new machine, the shifter forks were forged out of low carbon steel. With this steel the areas to be hardened had to be impregnated with carbon to the depth required (approximately 0.03 to 0.04 in.) by the pack carburizing process. This required packing the shifter forks in boxes surrounded by a carbonaceous material and heating to high temperatures for long hours in an oven. Then they were reheated and quenched to harden the areas desired. Because of the intense heat to which the entire fork had been subjected, some portions, such as tapped holes and thin sections, would warp considerably. To straighten the forks, each one had to be handled manually and pounded with a maul until it would pass an indicator gauge tolerance test. Then the shifter forks were taken back to the production line where the finish grinding and retapping operations were performed to complete the fork.

The shifter forks now are forged of high carbon steel (1046 normalized) and are com-

(*Turn to page* 96, *please*)

TORQUE CAPACITIES* FROM this

K Series K2R Series	Maximum Torque Inch Pounds Continuous Load	Hand Operation
K-1-C	350	2,000
K-2-A	350	5,000
L6S Series L6N Series	400	2,000

	Recommended Torque Rating, Inch Pounds	Needle Bearings
L10S Series	650	Optional
1FR Series	1,080	"
L14S Series	1,230	"
3DR Series	1,800	"
L16S Series	2,200	"
35N Series	10,000	"

N Series	Recommended Torque Rating, Inch Pounds	Balanced for
45N	14,000	3600 R.P.M. Max.
5N	20,000	"
50N	20,000	"
6N	38,000	"
60N	38,000	"
7N	57,000	"
70N	57,000	"
75N	70,000	"

BW Series	Maximum Torque Inch Pounds Continuous Load	Momentary Load
BW-12	1,020	4,450
BW-1	1,695	7,500
BW-2	3,350	11,720
BW-3	4,450	16,800
BW-4	5,080	22,900
BW-5	8,640	34,200
BW-6	11,620	60,000
BW-7	28,600	150,000
BW-9	89,300	500,000

*Extra shock-load capacity built into all sizes.

you'll get dependable, smooth power delivery when you specify

BLOOD BROTHERS

Universal Joints

FOR AGRICULTURAL, AUTOMOTIVE, INDUSTRIAL, MARINE AND CONSTRUCTION EQUIPMENT APPLICATIONS

Need a moderately small universal joint on your next project — for a hand-operated control rod, for example? Blood Brothers has it! In fact, you can select from any of four Series — all widely used on farm implements, road and construction machinery, tractor steering assemblies, etc.

Or do you need a source for high speed joints and propeller shaft assemblies for trucks, busses or other mobile equipment? Blood Brothers builds a wide selection of automotive assemblies with torque capacities to 70,000 inch pounds.

For really heavy work, look at the BW Series — for transmitting up to 1,400 H.P. with momentary loads reaching 500,000 torque inch pounds! It's the largest commercial universal joint made — and Blood Brothers makes it.

Thus, when you specify Blood Brothers, you can select from a wide range of torque capacities . . . and be confident of top-quality universals that contribute dependability and smoothness to your product's performance.

For details, contact Blood Brothers, stating your specific problem. We'll be glad to cooperate with engineering suggestions.

SUGGESTION: For future reference, clip this page for your file.

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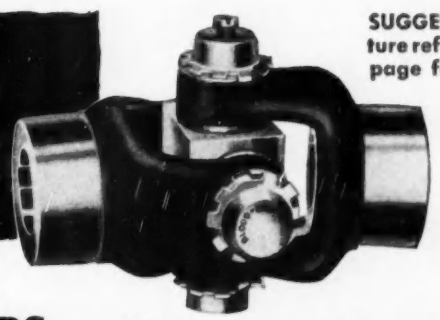


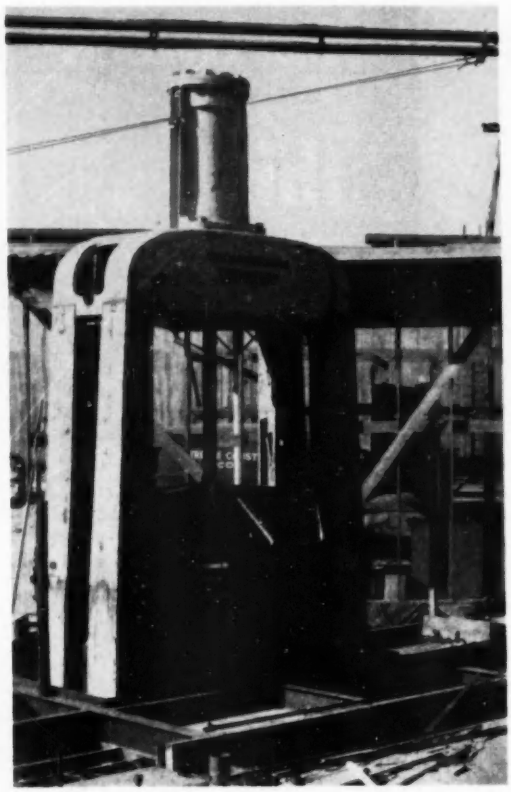
BLOOD BROTHERS machine co. ALLEGAN, MICHIGAN

UNIVERSAL JOINTS AND DRIVE LINE ASSEMBLIES

A Division of Standard Steel Spring Co. • Chicago Office: 122 S. Michigan

Concrete Blocks, Set on Springs

Cushion Air-Operated Drop Stamps



One of the Cecostamps located on its cushioned concrete block.

HUGE concrete blocks, weighing as much as 138,000 lb and cushioned by sets of coiled steel springs, form the foundations for two Cecostamps at Ryan Aeronautical Company's hammer forging department. These floating foundations will eliminate most of the vibration caused by operation of the hammers.

With each blow of their hammers, the new Cecostamps will exert as much as 106,000 lb of force. In the past, it was considered good practice to mount this type of machine on a wooden wearing surface and bolt it tightly to a fixed concrete foundation. This method permitted transmission of the vibration, almost undiminished, to all surrounding areas and subjected the machine to heavy shock.

As these effects became evident, a more efficient system of installing such equipment became necessary for this special application. The Korfund Co., makers of the steel spring vibro-isolators used in the Ryan installations, have pioneered in this development.

Mounting the machine directly upon an elastic material would reduce its efficiency. It is necessary to impose a time lag between the impact and the dispersion of the vibration so that the full force of impact is maintained. This is accomplished by placing an inertia mass between the anvil of the machine and the elastic insulation.

The Cecostamps are mounted upon reinforced concrete blocks which "float" in pits approximately 10 ft deep, 16 ft wide and 22 ft long. These masses momentarily absorb the force of the hammer blows. The blocks are suspended upon two rows of Korfund coiled steel springs placed along the bottom edges of the pits. Made of cold-rolled crucible steel, each of these vibro-insulators is capable of absorbing a force of 2800 lb per inch of deflection. More than 100 of them are located in the larger installation to absorb the vibration from the inertia block.

Closeup of a set of Korfund coiled steel springs. Each spring is capable of absorbing 2800 lb per inch of deflection.

Starting with the impact loads and vibration frequencies of the Cecostamps, Ryan plant engineers designed the inertia blocks to attain the most desirable insulation characteristics and maintain the impact force of the machines. From these data, it was determined that the total force to be transmitted to the foundation, for the larger installation, would be 342,500 lb. This

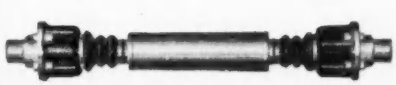
(*Turn to page* 104, *please*)

As Time Goes By . . .

. . . "DETROIT" Sets the Pace for Universal Joints

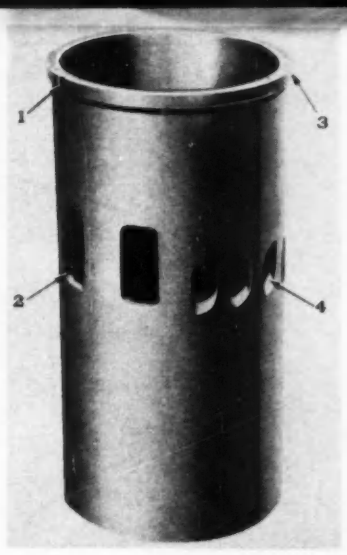
America's leading cars—thoroughbreds of the road—have come a long way since the first "one-lunger". During this progress, the continual step-up of engine power has increased tremendously the burdens placed on universal joints. Improvements in "DETROIT" Universal Joints have kept pace with car and truck design to help America's vehicle manufacturers achieve products of vision and initiative.

DETROIT
UNIVERSAL JOINTS



UNIVERSAL PRODUCTS COMPANY, Inc., Dearborn, Michigan

New Two-Stroke Loop Scavenged DIESEL

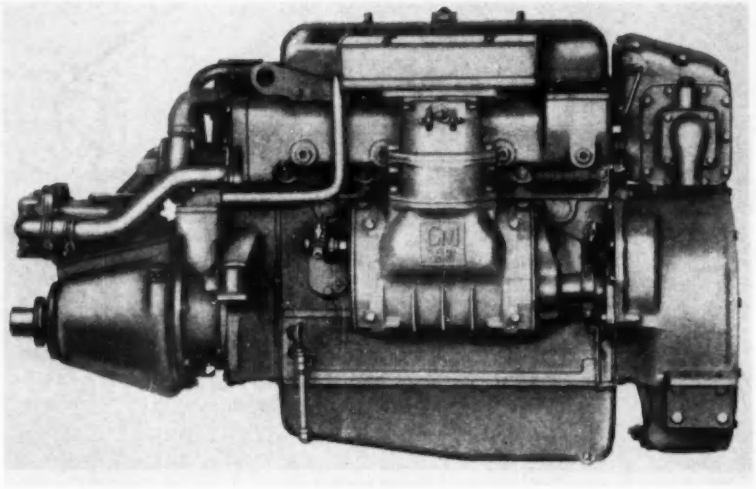


Cylinder liner showing air intake and exhaust ports. 1—Notch for retaining dowel. 2—Exhaust port. 3—Flange for seating cylinder liner in block. 4—Intake port.

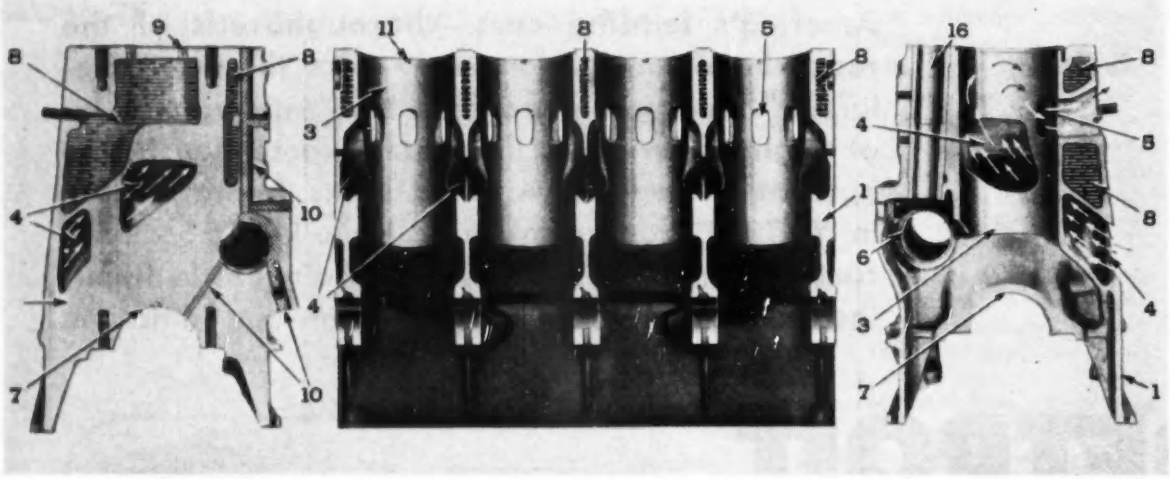
A NEW 87 horsepower marine Diesel engine is being introduced this month by the Detroit Diesel Engine Division of General Motors. Like Detroit Diesel's 71 and 110 series engines, the new Series 51 power plant is of two-stroke design. It has four cylinders inline with a total displacement of 216 cu in. Combustion chambers are of the open type with no precombustion chambers or special cells needed to insure complete combustion. The engine is "square"; both bore and stroke are 4.1 in. It develops 87 hp at 3000 rpm and has an output of 80 hp at 2500 rpm with accessories.

Detroit Diesel engines have always used intake ports in the cylinder liners to deliver fresh air to the combustion chambers. Exhaust has been through

(*Turn to page* 106, *please*)



Series 51 marine Diesel with direct drive and reverse gear.



These cutaway illustrations show air, water and oil passages in block, and loop scavenging in cylinders. 1—Cylinder block. 3—Cylinder liner. 4—Air intake passage. 5—Exhaust ports. 6—Camshaft bearing. 7—Upper main bearing support. 8—Cooling water jacket. 9—Block to cylinder head water passage. 10—Oil passage. 11—Liner locating dowel hole. 16—Sleeve cam follower hole.

the extra BRAKING STAMINA proven here...

means greater DEPENDABILITY on any hauling job!

Dam Construction on the Columbia River.

Rugged Bendix-Westinghouse Air Brakes Keep Giant Earthmovers on the Job Day after Day!

Why not take a braking tip from the men who operate the rugged off-the-road giants. They'll tell you it takes **stopping power, durability and performance-plus** to provide perfect braking control for nearly 50 tons of solid rock and steel, defying gravity up grade and down under the very toughest of operating conditions. Ask them what brakes they choose for this tremendous task and time after time you'll get the same answer—Bendix-Westinghouse. That's because these mighty brakes, built by the industry's most experienced manufacturer, pay off with the **safest, surest, most dependable braking action** and longest service life in the business. And these are factors that mean **reliable, economical performance** on any hauling job. That's why, no matter what type trucks or buses you build you'll be sure to give your customers the most in safety, dependability and savings by specifying Bendix-Westinghouse—the world's most tried and trusted air brakes.

Bendix-Westinghouse

THE WORLD'S MOST TRIED AND TRUSTED

AIR BRAKES

BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY • ELYRIA, OHIO • BERKELEY, CALIF

Automatic Induction Hardening

(*Continued from page 90*)

pletely machined to finished tolerances (including finish grinding operations) before being processed by the induction hardening machine. Since only the parts of the fork to be hardened are heated by this new method, warpage of the part is eliminated to the point where straightening and retapping each piece after hardening, is no longer required. The machine is installed directly in the assembly line so trucking is eliminated and the heating furnace operations are completely by-passed.

A standard two-position, Westinghouse 20-kw, 450-kc r-f generator was modified for this application by the addition of the following major components:

1. Two lifting indexing turntable mechanisms.

2. Four table tops with eight fixtures each for holding the shifter forks.

3. Four combined coil-quench assemblies.

4. Pneumatic and electric controls and timers to provide the automatic features required.

5. A special r-f transfer switch to shift power from one heating position to the other as needed.

A typical sequence of the automatic operations performed by the machine in the order in which they occur is as follows:

1. Machine is started by pressing start button.

2. Left hand table rises lifting shifter fork into left hand coil.

3. Power applied to left hand coil producing heat in shifter fork.

4. Right hand table rises lifting shifter fork into its coil.

5. Left side power turned off immediately followed by lowering of the table and starting of the quench.

6. Transfer switch shifted so that power can be applied to right hand coil.

7. Power applied to right hand coil producing heat in shifter fork.

8. Left side quench water turned off and table indexed one eighth of a turn.

9. Right side power turned off, immediately followed by lowering of the table and starting of the quench.

10. Right side quench water turned off and table indexed one eighth of a turn.

11. Timer resets.

The two-position generator is better suited to this application since it affords an opportunity to increase production by having one station heating one shifter fork, while the other station is preparing another shifter fork for heating. The basic problem was to provide two accurately controlled pieces of work handling equipment which would automatically take each of four different types of shifter forks and place certain localized areas in a heating coil, quench these areas, and automatically eject them into a tote pan at a minimum rate of 5400 pieces per 16-hr day. Two lifting, indexing, turntable mechanisms were used to accomplish this purpose.

A completely closed recirculating water system was supplied as part of this equipment to supply cooling water to the generator (oscillator tube, tank coil, etc.). A separate system was furnished to supply cooling water for the heating coils. After passing through the coils this water

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is drained off through the main sink drain. The coil cooling water is controlled by a manual valve and is turned on before starting the machine each morning.

A separate quench water system also is provided. The quench water is controlled by means of a solenoid valve (one for each of the two positions) actuated by the master timer.

One coil is provided and used exclusively with each of the table tops. The term "coil" as used here includes not only the actual work coil but also the heavy copper leads, terminal blocks, and integral cooling water tubes. Since two of the shifter forks have three areas to be hardened and the other two shifter forks have two areas to be hardened, the coil for each part is different and so constructed that the areas to be hardened are directly in the concentrated radio frequency field. The actual design of the coils was determined after preliminary laboratory work.

The quench water fixture is essentially a water spray head. The water spray at high pressure is directed at the heated areas of the shifter fork, reducing the surface temperature rapidly enough to effect a hardened case to the desired depth. Numerous high-pressure spray jets are required as they prevent small insulating steam pockets from forming on the surface of the hot metal.

By using this process for heat treating shifter forks the manufacturer was able to reduce the cost of producing them by a substantial amount. These savings were realized primarily by reducing the labor cost. With the new process of selective heating and quenching, warpage for all practical purposes is eliminated and the parts can be finish ground before hardening.

The automatic induction hardening machine requires little maintenance. Since its capacity is approximately 35 per cent above the manufacturer's requirements, normal down time for maintenance is easily scheduled.

This new machine has improved the quality of the product by affording an opportunity to closely control the hardness and the hardness pattern of the finished shifter forks.

AUTOMOTIVE INDUSTRIES . . .

is your News Magazine of Automotive and Aviation

MANUFACTURING

Buick's V-8 Engine and New Dynaflow

(*Continued from page* 55)

was adopted to take advantage of greatly increased secondary voltage which assures positive ignition at all speeds in this high performance engine.

Incident to this high secondary voltage, it was found necessary to insulate spark plug terminals against corona losses and spark leakage. This is accomplished by using a high temperature resistant Neoprene spark plug boot.

The 12-volt generator has the same physical dimensions as the one used on the former Series 70, except for relocation of the mounting gears. It features an extruded pole frame and has a rated output of 30-amp at 14 volts. Its rating is 420 watts as compared with 360 watts with a six-volt system, this output being available to a somewhat lower speed.

The Delco-Remy distributor for V-8 engines was specifically designed for 12-volt operation, and features a larger diameter housing and cap. Two small vertical ribs are formed on the inner surface of the cap between terminals to increase the length of the leakage path between adjacent terminals. In addition, the distributor cap is made higher to permit use of a higher rotor to eliminate arcing between the rotor and breaker plate or distributor housing.

The new ignition coil is of high ratio type with primary inductance of nine-mh. It is said to give improved low speed performance without an increase in primary current. Construction is similar to former practice except for an external resistor mounted on an adjacent bracket and connected in series with the primary circuit.

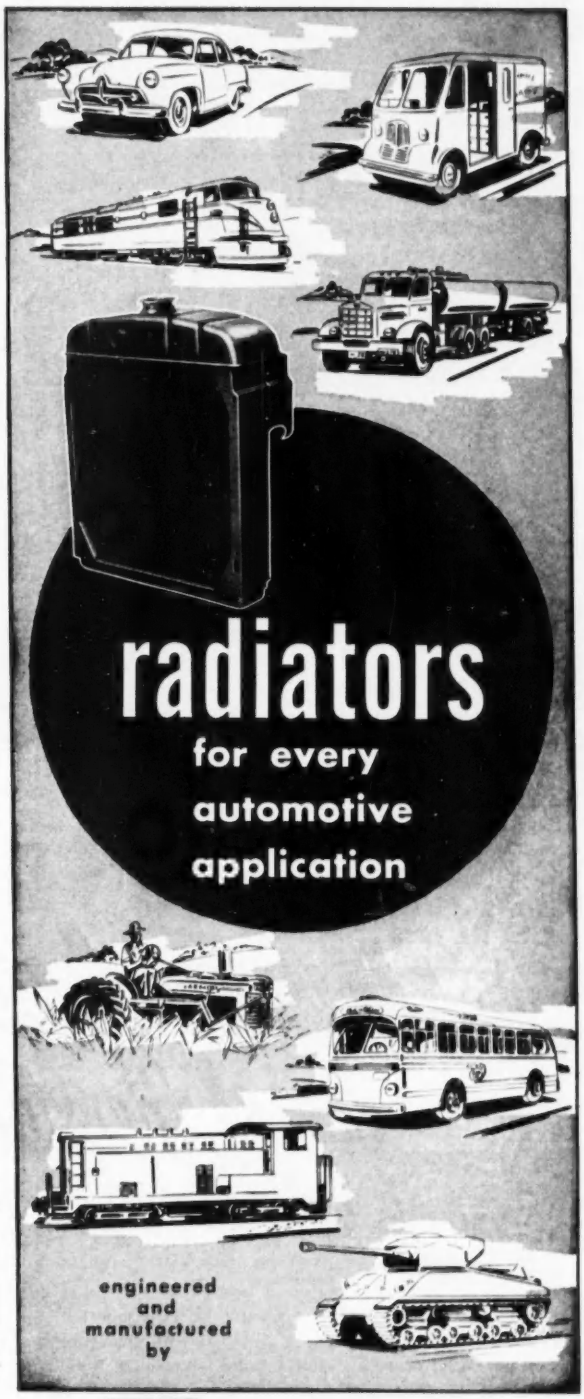
Provision is made to by-pass the resistor during cranking operations so as to partially overcome the effects of reduced voltage due to the drain on the battery. To effect this, a terminal on the starter solenoid furnishes a direct circuit from the battery to the coil without passing through the resistor. This circuit is closed only while the starter solenoid is energized.

One significant change in sheet metal this year is the adoption of an alligator type hood, spring balanced to hold any position. The main hood lock can be released through a single cable connection to the instrument panel.

Body Changes

Bodies remain substantially the same except for a number of revisions. For one thing, the shroud sides and upper panel of all Series is changed for mounting the alligator hood. Series 50 and 70 dash panels have been altered to permit use of Series 40 defroster core and housing assemblies. Dash insulation density now is the same on both 50 and 70 bodies. Because of the V-8 engine installation, built-in ventilating ducts on 50 and 70 bodies now are part of the fender skirts.

(*Turn to page* 112, *please*)



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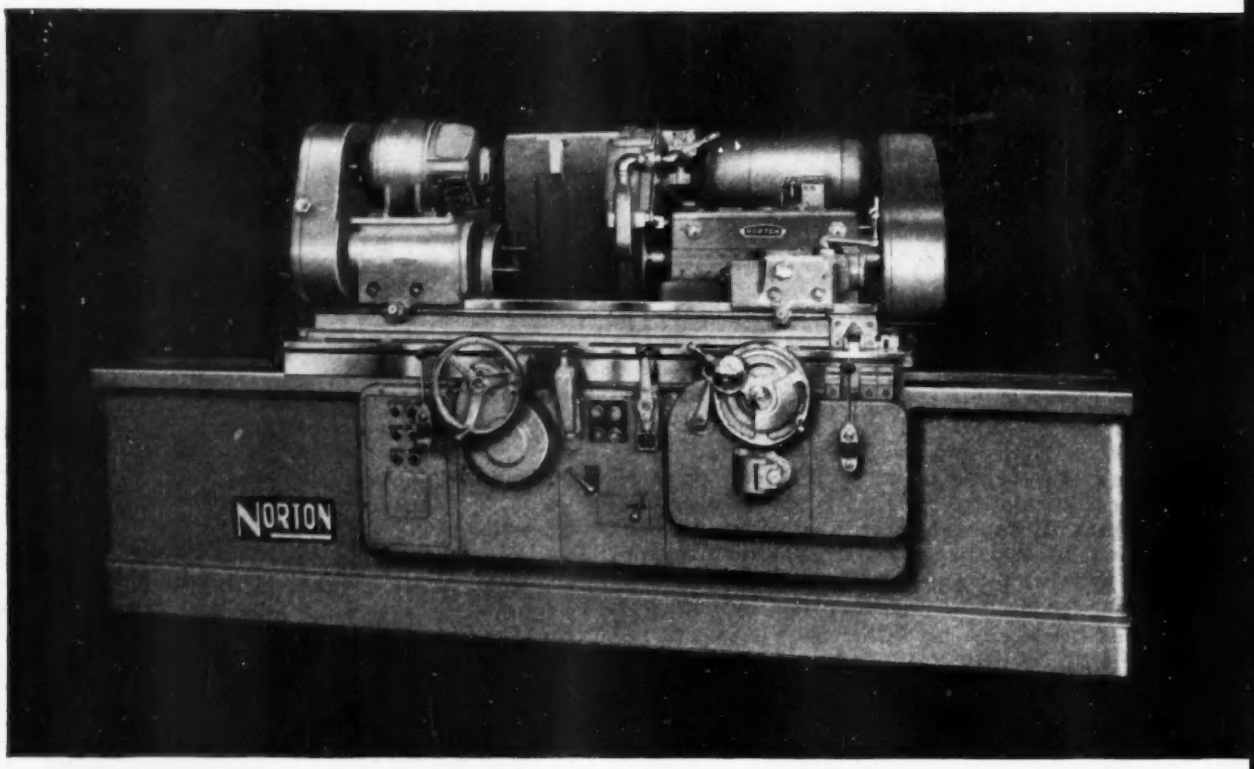

NORTON 10" TYPE CTU Semiautomatic Grinder is first choice on production lines and in job shops. No other cylindrical grinder offers you such a unique combination of speed, accuracy, flexibility and sturdiness. No wonder users have reported that Norton 10" CTU's have doubled production . . . replaced 2 or 3 machines . . . eliminated extra operations . . . made operators more productive. *Catalog No. 1787* gives you complete data about sizes, advantages, features and optional equipment that help you put extra profits into your production. It will pay you to look into the high-speed, high-finish grinding this machine makes possible.

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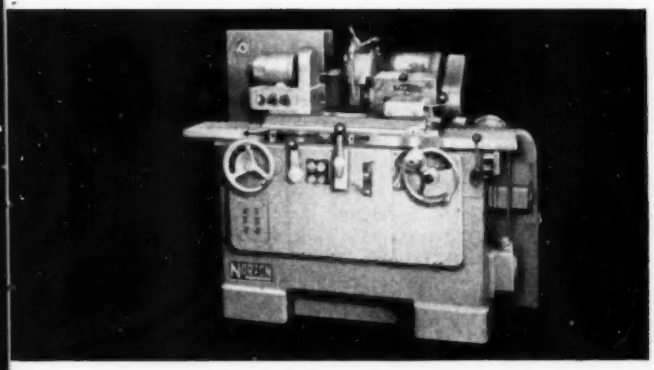
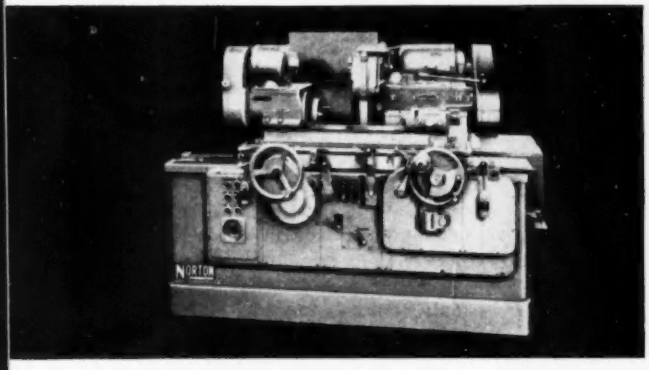
For complete information, see your Norton Representative or write us direct for the catalogs listed under the machine illustrations. NORTON COMPANY, Machine Division, Worcester 6, Mass.



NEW NORTON 4" TYPE CTU Semiautomatic Grinder in 12" and 18" work length capacities now makes it practical for you to apply Type CTU high-speed, high-finish grinding to small parts. *Catalog No. 531* gives you full details.



NORTON 6" TYPE CTU Semiautomatic Grinder, in 18" and 30" work length capacities, has a performance record that's worth investigating. *Catalog 1488* tells the whole interesting story.

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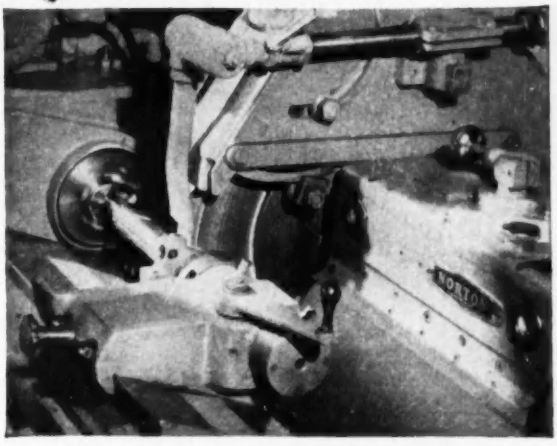

2. Machine automatically grinds part to required size and finish — while operator attends another machine.

3. Operator unloads machine.

Piston and Ring Setups

(*Continued from page* 65)

top ring groove to reduce wear and pounding.

Chromium-plated top rings cost more than plain rings. However, in heavy duty service—motor trucks, taxicabs, commercial engines, Diesel engines—such rings have shown unquestioned advantages in reducing not only ring wear and scuffing but cylinder barrel wear as well. In passenger car engines the decision hinges on cost balance as well as considerations of service experience. The fact is that a number of passenger car engines are fitted with chromium-plated top rings—at least one in the lowest price range; and Packard for 1953 in the highest price range.

One piston ring producer points to rings having a chromium flash of only 0.0005 in. as offering adequate protection during the break-in period and being sufficiently long lived thereafter to justify installation. Thicker coatings—from a minimum of 0.002 in. to a maximum of 0.004 in.—are essential for protection in high-mileage passenger cars, taxicabs, and motor trucks. It is only fair to note that in the hands of the first owner, an engine tear-down to cure excessive oil consumption frequently may show that rings are sludged rather than excessively worn. This could be cited as a good reason for staying with plain cast iron rings if service history has been good.

Nevertheless, the chromium-plated ring has unquestioned advantages and is expected to make further headway in passenger car engines as time goes on, regardless of somewhat higher cost.

Use of a steel snap ring in the top ring groove gained acceptance in recent years in the replacement field where it was found of major benefit in salvaging worn pistons. Later on, its use was extended to heavy duty engines where ring wear and pounding is a factor of major importance. Here the protective steel belt was found to be effective in preventing wear and pounding of expensive aluminum alloy pistons. Some heavy duty pistons, offered by leading manufacturers, have an integrally-cast steel ring for this purpose.

When it comes to the adoption of a steel ring in production passenger car engines, we are faced again with a question of cost and whether or not the added cost can be justified. For it is a fact that ring pounding is not a major problem in passenger car engines, at least in the hands of the first or second owner.

On the other hand, there are those with experience in the piston ring field who believe that ultimately the steel ring will find adoption in production passenger car engines.

Since 1880 Tuthill has specialized in designing springs to fit every specific need. Whether your spring requirements are for trucks, buses, automobiles, power shovels, farm wagons or dual and triple axle heavy-duty jobs—Tuthill can meet them quickly and economically. And now, MOLYBDENUM DISULPHIDE (MoS_2) . . . the newest Tuthill extra that keeps springs from *squeaking* and *galling*, is an added Tuthill feature that distinguishes this famous line.

Whatever your spring requirements may be — see Tuthill first!

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SERVICE CLASSIFICATIONS AND DESIGNATIONS FOR LUBRICATING OILS FOR AUTOMOTIVE TYPE ENGINES, *published by American Petroleum Institute, 50 West 50th St., New York, N. Y. Price, $6.00 per hundred in lots of 100; $1.00 per 1½, in lots of 14; no charge for single copies.* Written to explain the new API service classifications and designations for motor oils, this booklet points out the benefit to the motoring public in being able to select the right oil for any engine under any service condition. It is also said to afford greater opportunity for the development of better oils to meet specific service conditions without regard to other requirements.

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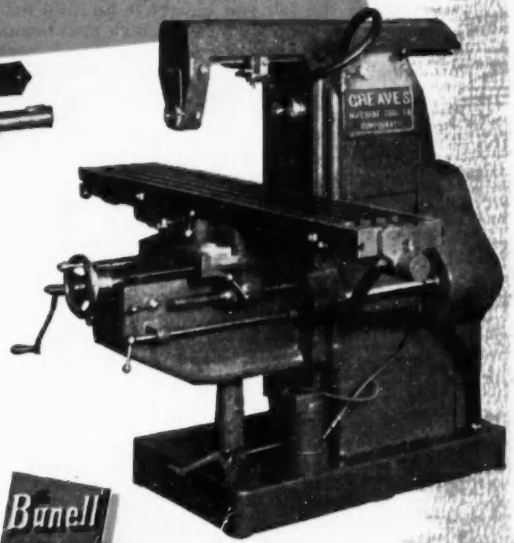

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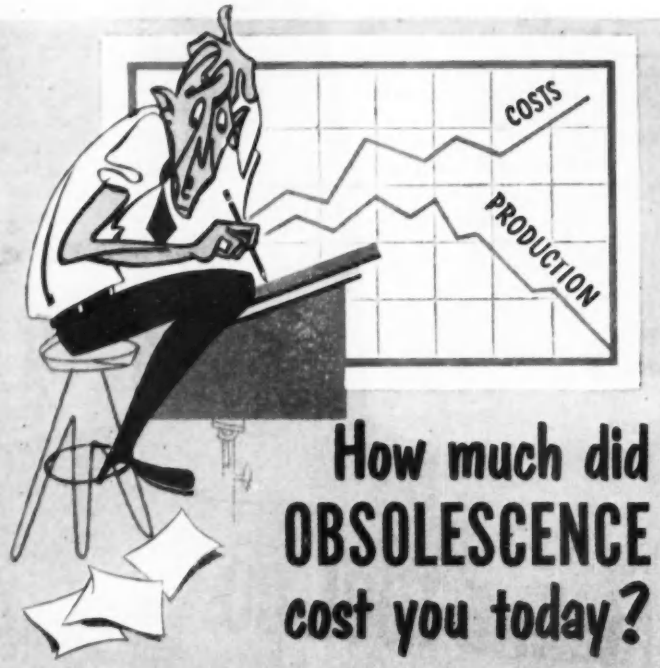

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Ford Tractor

(*Continued from page* 59)

The hydraulic pump, with larger displacement, is mounted on the engine and driven from the camshaft. It provides a constant source of hydraulic power while the engine is running, regardless of whether the clutch or power take-off is engaged. It is a multiple vane type pump delivering a steady flow of oil.

An adjustment can be made on the pump enabling it to maintain a constant flow of oil at 2.25 to 2.8 gpm for all speeds from 1200 to 2000 engine rpm. Also by adjustment, a maximum output of five gpm at 2000 engine rpm can be obtained when faster actuation of the cam cylinder is required.

An independent oil reservoir for the hydraulic system permits the use of an oil designed specifically for hydraulic operation. This eliminates the possibility of foreign matter from the transmission or differential damaging the system. It also allows faster response in cold weather. High pressure steel tubing is used throughout the system.

Lift capacity of the hydraulic mechanism has been increased over 300 lb by higher operating pressure in the system.

Concrete Blocks

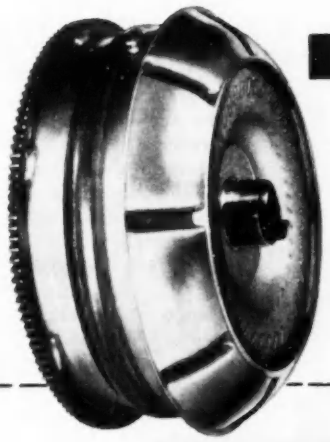
(*Continued from page* 92)

figure governed the number and capacity of isolating springs used.

For physical reasons, the vibration frequency of the machine should be considerably different than that of the isolating medium. If this proportion were reduced to a one-to-one ratio, the machine would be in resonance with its foundation and a dangerous condition would exist. Under this condition large amplitudes of motion and excessive forces can be transmitted.

In operation, the inertia blocks receive the impact of the Cecostamps, hesitate momentarily and depress the supporting springs ⅜ in. The huge foundations oscillate until the energy is dissipated, through friction.

Coiled steel springs can be precisely designed to deliver specific capacities. Their characteristics depend upon their dimensions, design and heat treatment. Also, steel springs have a damping coefficient of less than 0.5 per cent.



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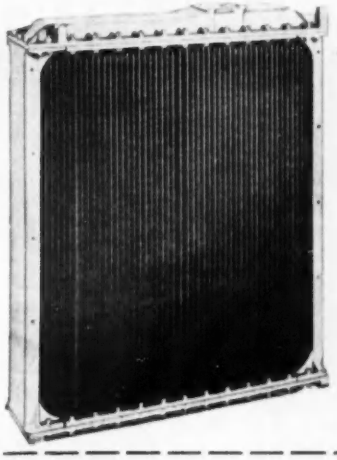
LONG RADIATORS



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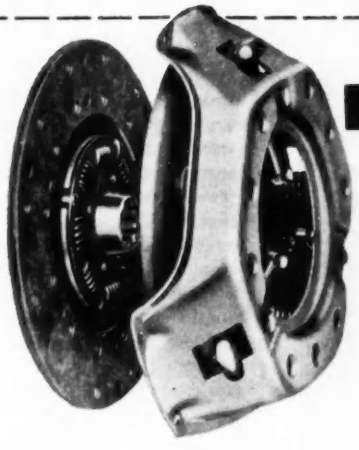

LONG CLUTCHES

Rugged and dependable, Long clutches provide effortless shifting, smooth power flow. With Long's semi-centrifugal design, torque capacity increases as speed increases. That means less slippage, less wear, low pedal pressure . . . *longer service!* Since 1922, Long has provided heavy-duty clutching to leading vehicle manufacturers.

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LONG

CLUTCHES • RADIATORS • TORQUE CONVERTERS • OIL COOLERS

Two-Stroke, Loop Scavenged Diesel

(*Continued from page* 94)

exhaust valves operated from the camshaft. The new engine, however, utilizes another set of cylinder liner ports for the purpose of exhausting the used gases from the cylinders. These ports are larger than the intake ports and their use, instead of valves, permits more efficient operation of the engine at high speed, reduces the number of moving parts required and also reduces the overall height of the engine.

A Roots type blower supplies air which travels from the blower to the combustion chambers through passages in the block. These passages have a pronounced upward slope to direct the air upward and across the top of the cylinder. Spent gases are thus swept out of the combustion chamber through the exhaust ports and are replaced with fresh air at the bottom of each power stroke. At the top of the compression stroke the proper amount of Diesel fuel is atomized and sprayed into the chamber. Compression ratio is 18 to 1.

Several other features of design contribute to the simplicity of the engine. The pneumatic governor used is extremely simple in design and is free of rotating parts. The lubricating oil pump has a new and unique location eliminating the need for a gear or chain oil-pump drive. Aluminum end plates furnish steel-to-aluminum bearing surfaces on the blower eliminating the need for antifriction bearings in this assembly. Rayon flocking is securely bonded to the blower rotors to assure maximum sealing action.

The lubricating oil pump is of the rotor type. Its inner rotor, which is mounted directly on and revolves with the crankshaft drives the outer rotor. Hence, no gear or chain pump drive is needed. Capacity of the pump is 22 gpm at 3000 engine rpm. The pump picks up oil from a sump and forces it through a plate-type oil cooler mounted on the camshaft side of the cylinder block. From the cooler it is forced into the hollow camshaft and thence to the various bearings and other points requiring pressure lubrication.

The entire governor (including a two and one-half lb venturi casting) weighs only four lb. Principal parts are the venturi casting, air intake valve, a simple diaphragm and a coil spring which tends to move the injector control lever to a full fuel position. As engine speed increases or decreases according to load, the resulting air pressure fluctuations in the venturi vary the vacuum in the diaphragm and cause it to expand and contract. As the diaphragm is connected to the spring, this action works against the spring allowing the injector control lever to move back and forth to varying fuel delivery positions. The new engine has a centrifugal type fresh water pump and an impeller type raw water pump. In keeping with common marine practice the flywheel is located on the forward end of the engine to provide better conformity with the hull and to permit easier installation of a front power take off. Replaceable main and connecting rod bearings and replaceable cylinder liners are used.

Dimensions of the power plant are as follows: Overall length, including

(*Turn to page* 110, *please*)

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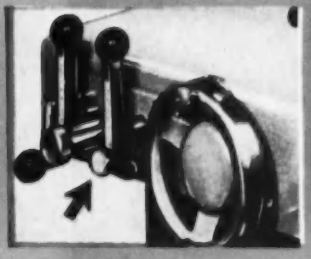
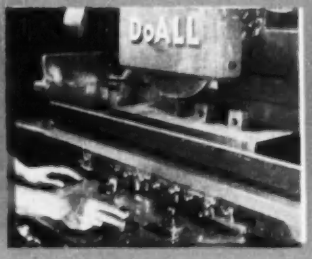
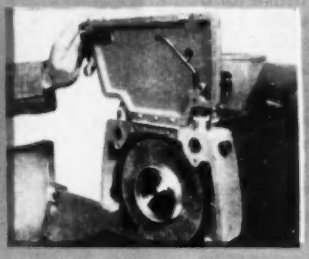


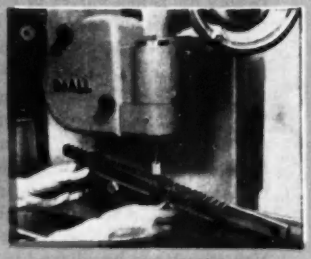
Variable speed wheel dressing feed.



Skip feed for intermittent plunge grinding.



New flood and "Cool-Grinding" system.



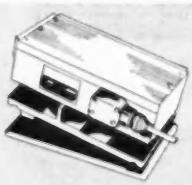
High speed spindle, vertical or horizontal.

ATTACHMENTS and ACCESSORIES

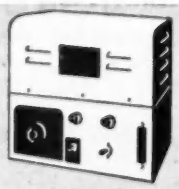
1. **Coolant System** —"Cool-Grind" (coolant through the wheel) or flood grind, or both simultaneously.
2. **Coolants** for every job.
3. **New Laminated-top Magnetic Chuck.**
4. **Magnetic Sine Chuck**—for fast easy setups on single or compound angle work.
5. **Selectron**—for controlling magnetic chuck holding power—and demagnetizing.
6. **High Speed Spindle Attachment Vertical or Horizontal**—provides speeds up to 20,000 RPM, for use of very small wheels.
7. **Variable Spindle Drive**—electronic control provides infinitely variable speeds.
8. **Crush Dresser Spindle Drive**—slow-speed drive for wheel crushing.
9. **Crush Grinding Attachment**—provides steady table speeds down to 1" per minute—includes heavy duty spindle.
10. **Adjustable Crush Roll Idler Stand**—permits tilting of crush rolls.
11. **Motor-Driven Crush Roll**—for forming grinding wheel or crush rolls.
12. **Automatic Downfeed**—can be set to feed at each reversal, or alternate reversals of table.
13. **Automatic Skip Feed**—table travel speeds up between multiple work pieces when plunge grinding.

BAND MACHINES

MAGNETIC CHUCK

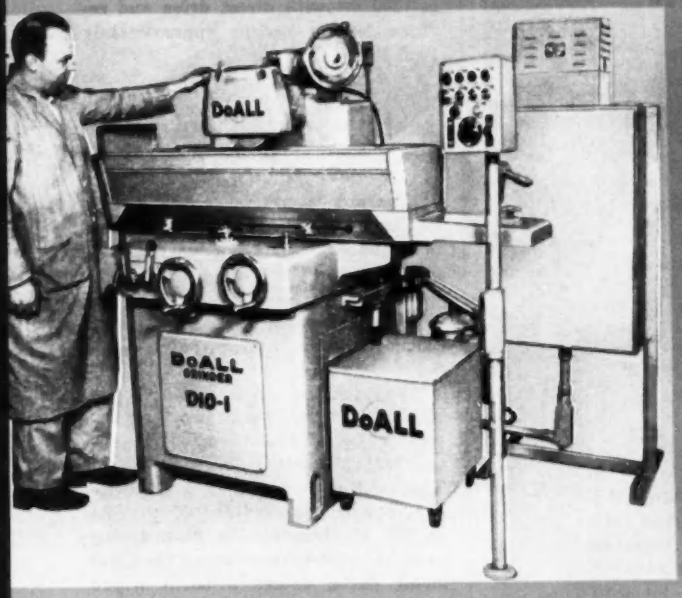


SINE CHUCK



SELECTRON

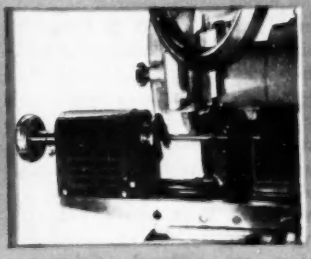
NEW LINE OF DoALL *Precision* SURFACE GRINDERS



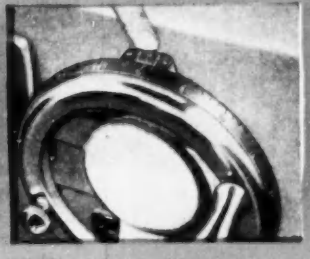
D-10 Models—10" x 30" chuck with 10" or 14" wheels.

- *NEW* SIZES—including 6" x 24" and 10" x 30".
- *NEW* 12½" WORK HEIGHT CAPACITY.
- *NEW* SPEEDS—up to 100 fpm table travel.
- *NEW* RECIRCULATING "COOL-GRINDING" SYSTEM.
- *NEW* RIGIDITY AND STURDINESS.
- *NEW* ATTACHMENTS AND ACCESSORIES.
- *NEW* CONVENIENT CONTROLS.
- *NEW* FULLY AUTOMATIC OPERATION.

...and more!



Cylindrical grinding and indexing attachment.



Slip rings for zeroing handwheels.

NEW DoALL Surface Grinders will handle an unlimited variety of surface grinding, cylindrical grinding and form grinding jobs with a heretofore unattainable combination of precision and speed.

You have to see them perform to visualize their capabilities. Ask to have a free demonstration in your own plant. Call your local DoALL Sales-Service Store, or write:

THE DoALL COMPANY
254 N. Laurel Ave. Des Plaines, Ill.

14. **Fully Automatic Surface Grinding**—controls cross-feed and downfeed automatically.
15. **Cylindrical Grinding Attachment**—for straight and taper cylindrical grinding and indexing.
16. **Dust Collector**—for all dry grinding operations.
17. **Wheel Dressing Diamonds and Holders.**
18. **Universal Vise**—completely adjustable for holding work in any position.
19. **Set of Plain Centers.**
20. **Wheel Balancing Stand and Arbors.**
21. **Grinding Wheels.**
22. **Complete Electrical Panel Remote Control Systems.**

DoALL

NEW CATALOG

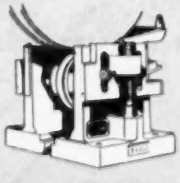
Free. Complete data and description of DoALL Grinder design and construction—coolant systems—controls—automatic setups—attachments. Ask for your copy.

COOLANTS

GRINDING WHEELS

DIAMOND DRESSER

DUST COLLECTOR



CRUSH ROLLS

GAGE BLOCKS

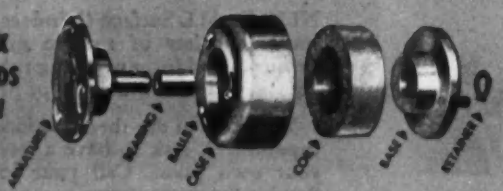
LEDEX ROTARY SOLENOIDS

...give positive, powerful snap action!

here's how a **LEDEX ROTARY SOLENOID** *operates...*

The magnetic pull moves the armature along the Solenoid axis. This action is efficiently converted into a rotary motion by means of ball bearings on inclined races. The inclined ball races are made to compensate for the magnetic pull increase as the Solenoid air gap closes, thereby providing substantially constant torque throughout the Solenoid stroke. The rotary snap-action power of the Ledex can be efficiently harnessed with a minimum of linkages, through the use of one or more standard features available on all models.

here's why **LEDEX ROTARY SOLENOIDS** *are dependable!*



As can be seen from the exploded view, Ledex Rotary Solenoids are simply constructed with few moving parts. All parts are manufactured to exacting tolerances and are carefully inspected and assembled.

The copper wire coil, the heart of the Solenoid, was developed especially for this product. It is wound by a precision winding process that puts a maximum amount of magnetic wire into available space . . . giving tremendous power to compact Ledex Rotary Solenoids.

six basic **LEDEX ROTARY SOLENOIDS** *to choose from!*

Model Number	2	3	5	6	7	8
Diameter	1⅛"	1¾"	1⅞"	2¼"	2¼"	3⅛"
Torque lb.-in.*	⅛	1	5	10	25	50
Weight lbs.	⅛	¼	½	1	2¼	4¼

*45° stroke intermittent duty.

Engineering data is available upon request. Write for descriptive literature today!

G. H. Leland INC.

123 WEBSTER STREET, DAYTON 2, OHIO

(*Continued from page* 106)

direct drive and reverse gear, is 49¼ in.; its height measured from the centerline of the output shaft is 21¼ in. It has a width of 26¾ in. with 22½ in. bolt centers. Basic engine weight is 1200 lb; with direct drive and reverse gear it weighs approximately 1400 lb.

Hot Spray Painting

(*Continued from page* 73)

phosphoric solution to further prepare the surface for paint application. Coming out of the washer, metal parts enter a Burdette gas-fired drying oven where they are thoroughly dried and readied for the first paint application.

Upon entering the first spray booth, the sheet metal parts are given a coat of primer surfacer which is sprayed at a temperature of 160 F. This coating is baked in a Burdette gas-fired drying oven for 20 minutes at 320 F. Leaving the first drying oven, the conveyor, carrying the sheet metal parts, enters a booth where undercoating and sound deadener are sprayed on the underside of cabs, fenders, and hoods.

The primer surfacer coat is then dry sanded, using a fine grit sandpaper. This operation smooths off rough spots and irregularities in the primer film, also promotes adhesion of the next layer of paint.

Two finish coats of synthetic enamel are sprayed on immediately after the sanding operation. Four colors, red, green, orange and gray, are standard —other colors are optional. Color enamel is hot-sprayed at 160 F and baked for 25 minutes at a temperature of 265 to 285 F.

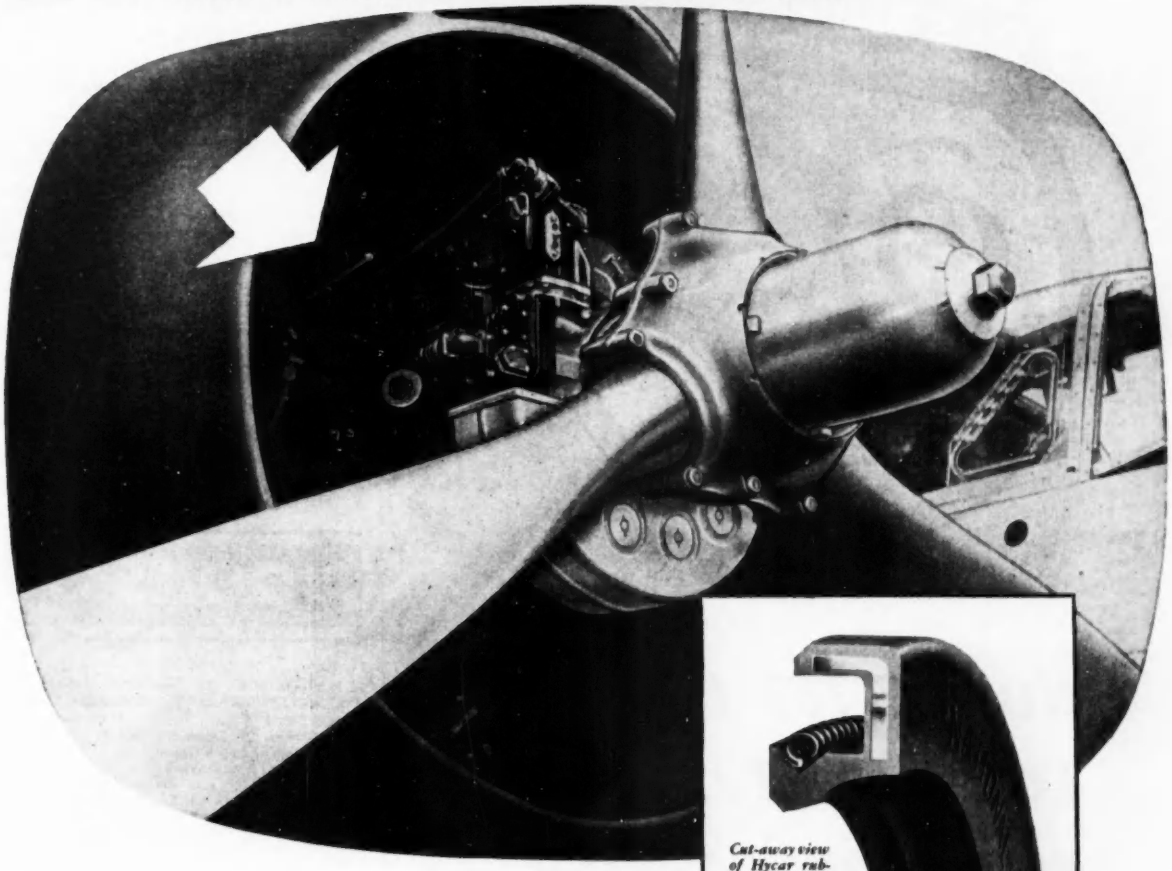
Spray booths were installed by Newcomb-Detroit and modified by Reo to combine down-draft design with a water wash.

BOOKS...

UNIVERSAL CATALOG OF ORIGINAL EQUIPMENT SERVICE PARTS, *published by Automotive Electric Association*, 802 Michigan Building, Detroit, Mich. Price, $1.00. Supplementing the 1949 edition, this 1952 number provides in one compact publication unit and service parts information on electrical, carburetor, gages, windshield wipers, and other specialized units for 1950, 1951, and 1952 passenger cars and trucks. Manufacturers' suggested list prices are shown as an aid to service stations and garages in making estimates to customers.

Another new development using

B. F. Goodrich Chemical *raw materials*



Cut-away view of Hycar rubber seal. Seal has 6½" i.d., molded onto metal base, is spring-tensioned, precision-trimmed.

NO OIL LEAKS HERE

—because of HYCAR!

Oil seals designed and manufactured by National Motor Bearing Co., Inc., Redwood City, Calif., for Hamilton Standard Division, Windsor Locks, Conn. B.F.Goodrich Chemical Co. supplies the Hycar rubber only.

PREVENTING leakage from propeller oil control assemblies is a vital job—calls for a seal with unique advantages. The seal must be positive, must resist the deteriorating effects of oil, extreme temperatures and high surface speeds.

It was only natural that the seal manufacturer chose Hycar nitrile rubber—for Hycar meets these rigid requirements.

The Hycar rubber seals are precision-molded and compact in design because of critical space limitations. They operate in temperatures ranging from −65°F. to 220°F. And they withstand the severe abrasion conditions resulting from surface speeds of 3,250 f.p.m.

These Hycar rubber seals are suitable for use with AN-O-8 Grade 1100 and AN-O-9 Grade 1010 fluids, and MIL-O-5606 oil.

Perhaps one of the many Hycar rubber compounds can solve a problem for you—can help you improve or develop a sales-making product. For Hycar resists oil, gas, heat and cold, aging, abrasion and many chemicals. For helpful technical information, please write Dept. H G - 1, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B. F Goodrich Chemical Company
A Division of The B. F. Goodrich Company

Hycar
American Rubber

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers • HARMON organic colors

O & S BEARINGS
NON-METALLIC • SELF LUBRICATING
O&S
NO MATTER HOW YOU LOOK AT IT... YOU'LL BE HAPPIER WITH O&S BEARINGS!
• NO MAINTENANCE
• NO CRITICAL MATERIAL
• ALWAYS DEPENDABLE
WRITE FOR BULLETIN Number 251
OR SEND US PRINTS and DETAILS!
NeverOil
SINCE 1918
O & S BEARING CO.
303 SOUTH LIVERNOIS • DETROIT 17, MICHIGAN

Buick's V-8 Engine and New Dynaflow

(*Continued from page 99*)

Air Conditioning Equipment

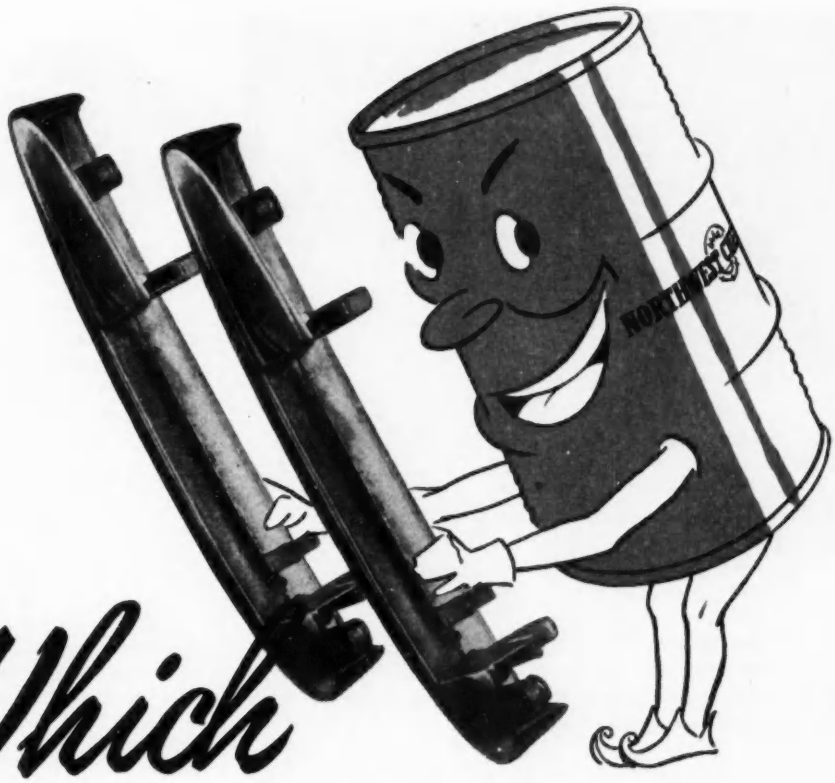
Air conditioning is offered as optional equipment only on models 76R and 72R, and 56R and 52. The compressor is belt-driven from the front crankshaft pulley and is mounted high on the right front side of the engine. The condenser for this system is mounted just forward of the radiator. The evaporator is housed under the rear compartment package shelf, circulates cooled air into the interior of the car through ducts. Outside air is constantly drawn into the system through scoops on the side of the body.

BOOKS . . .

HANDBOOK OF MATERIALS HANDLING EQUIPMENT, *published by The Caster and Floor Truck Manufacturers' Association, 27 East Monroe St., Chicago, Ill. Price, $1.00.* Designed to acquaint both industry members and laymen with the terminology and basic fundamentals of casters, wheels, hand and floor trucks, pallets and skids, this manual provides a basic working knowledge of all types of manual materials handling equipment and outlines principles by which considerable cost savings may be effected in the movement of materials. Each section is planned to tell what the equipment is, why it is made, how it is made, how it is applied or used, how to determine what is needed, and how to use an equipment catalog.

CAPITAL GOODS REVIEW, NUMBER 12, *published by Machinery and Allied Products Institute, 120 South LaSalle St., Chicago, Ill. Price, $0.25.* The theme of this issue of a quarterly report based on economic and business research is inflation and postwar profits. According to the report, postwar profits of U. S. industry have been overstated by more than $38 billion. This overstatement, the study explains, is due to the practice of basing depreciation charges for fixed assets and cost of inventory on original cost rather than replacement cost. The report delves into the details of this situation and its results.

LAND ACQUISITION AND CONTROL OF ADJACENT AREA, *published by Highway Research Board, National Research Council, 2101 Constitution Ave., Washington, D. C. Price, $0.90.* This bulletin (No. 55) includes the report of the Committee on Land Acquisition and Control of Highway Access and Adjacent Areas of the Highway Research Board. Latest developments in laws, judicial decisions and administrative regulations promulgated by state and local units on the subject are included. Feature articles are devoted to "Reservation of Highway Right-of-Way Prior to Acquisition" and "Roadside Zoning."



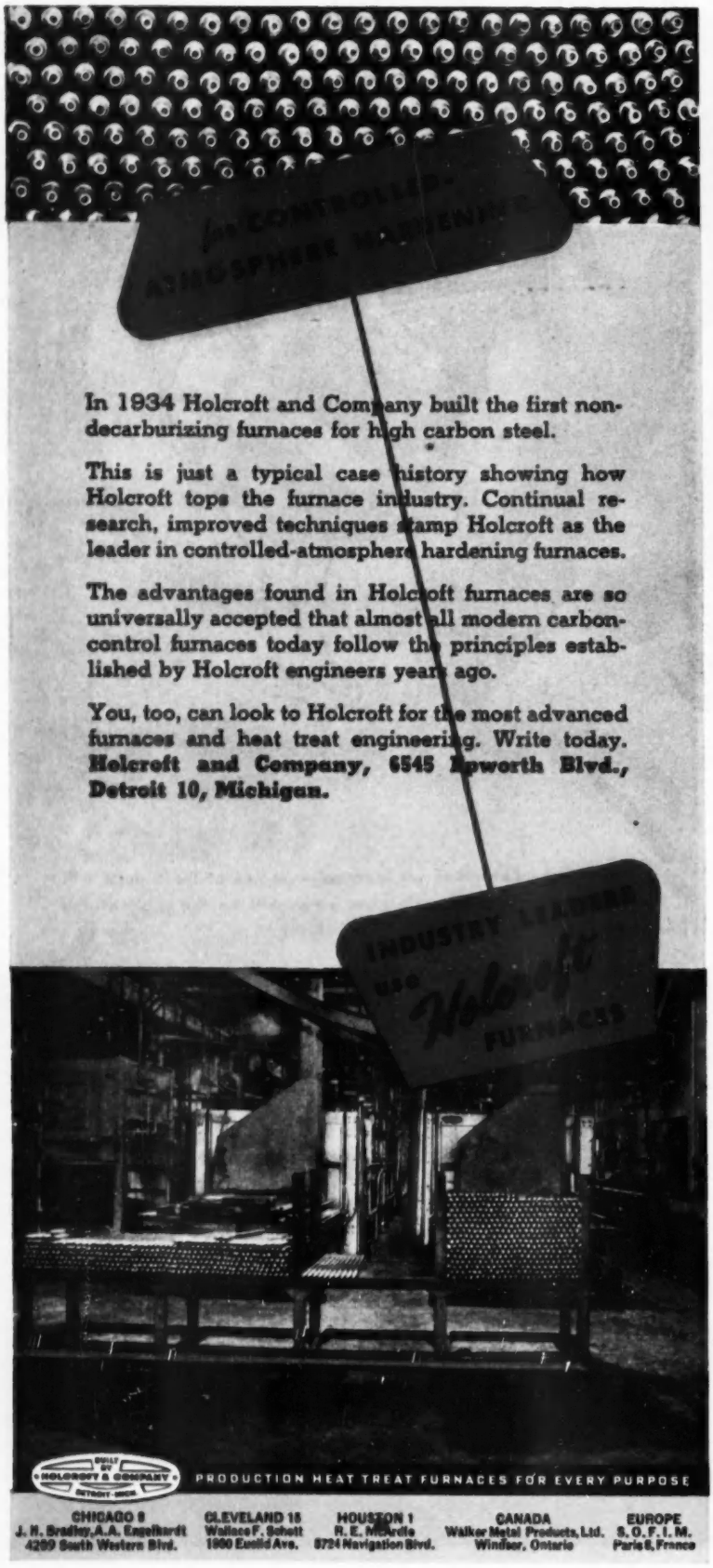
Which One?

They look alike—they are identical—yet one of these parts will wind up as a reject while the other will be the pride of the finishing room.

They both look clean and ready for finish—the difference is that one is "chemically" cleaned with job-adjusted Northwest products while the other got by with a fast dip and rinse.

The finish can be no better than the cleaning job beneath it. Why take a chance with haphazard methods and ordinary chemicals when it costs no more to be *sure* they're clean with a Northwest job-adjusted treatment?

Got a problem? Let our cleaning experts help you!



In 1934 Holcroft and Company built the first non-decarburizing furnaces for high carbon steel.

This is just a typical case history showing how Holcroft tops the furnace industry. Continual research, improved techniques stamp Holcroft as the leader in controlled-atmosphere hardening furnaces.

The advantages found in Holcroft furnaces are so universally accepted that almost all modern carbon-control furnaces today follow the principles established by Holcroft engineers years ago.

You, too, can look to Holcroft for the most advanced furnaces and heat treat engineering. Write today. **Holcroft and Company, 6545 Epworth Blvd., Detroit 10, Michigan.**

BUILT BY HOLCROFT & COMPANY DETROIT, MICH.

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO 9
J. H. Bradley, A. A. Engelhardt
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CLEVELAND 15
Wallace F. Schott
1900 Euclid Ave.

HOUSTON 1
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8724 Navigation Blvd.

CANADA
Walker Metal Products, Ltd.
Windsor, Ontario

EUROPE
S. O. F. I. M.
Paris 8, France

SHORTIES

An average new car in 1940 cost about $788. A current average, computed on the same basis, is approximately $1835, with several hundred dollars of the increase accounted for by higher taxes.

•

An average factory worker in 1940 had to work about 31 weeks to earn the price of a new car, while today the "work price" is down to 28 weeks.

•

The liquid oxygen tanks used on some guided missiles must withstand high pressures at temperatures as low as —325 F.

•

A single giant U. S. transport plane carries enough fuel to drive a passenger automobile 165,000 miles—more than 6½ times around the world at the equator.

•

In a modern jet bomber's wing alone, there are nearly 6000 bolt holes which must be accurate within one-to two-thousandths of an in.—or less than the thickness of a human hair.

•

Aerodynamic forces exerted on a supersonic fighter are so great that the plane's power control system must be capable of exerting 100 times more pressure on the control stick than can a human pilot.

•

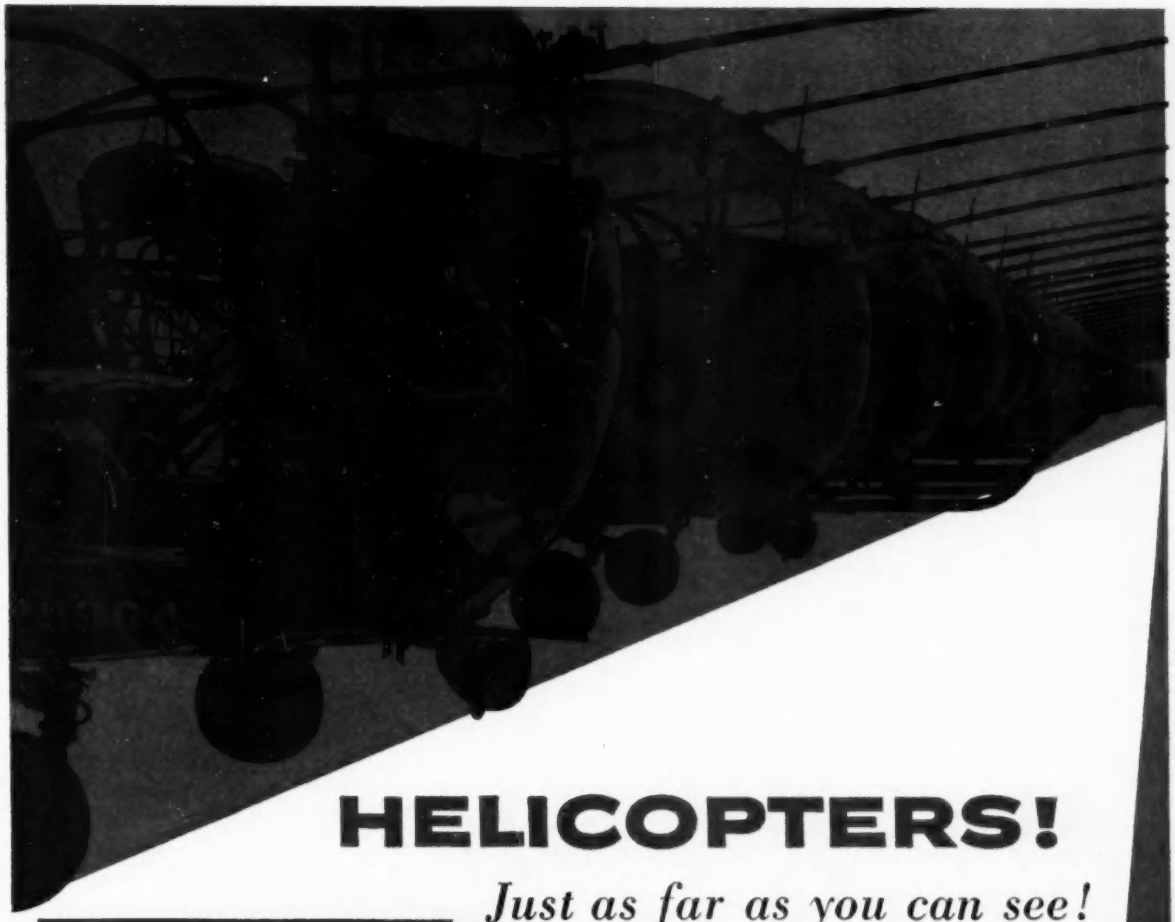
According to Labor Dept. figures, about four workers out of every 100 quit aircraft jobs each month, six leave the automobile industry, and 13 depart from the shipbuilding industry.

•

A typical engine manufacturer's base labor rate increased 250 per cent from 1941 to 1951.

•

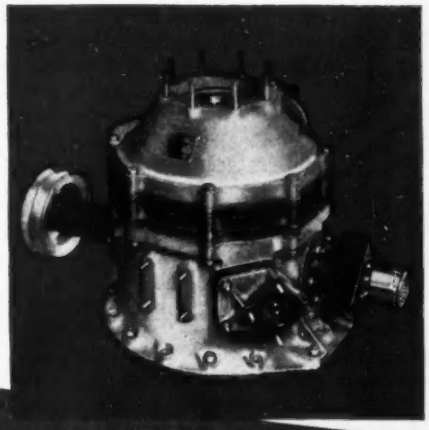
Approximately 95 per cent of all the work which is done in U. S. manufacturing industries is performed by mechanical energy, while a little less than five per cent is the product of human effort.



HELICOPTERS!

Just as far as you can see!

And with our precision gears they do the most amazing things!



A lot of the performance in terms of smooth even power is due to the precision-made Rotor Transmission Manufactured by the Steel Products Engineering Company for the Bell Aircraft Corporation.

For 38 years we have been designing and producing gears, gear assemblies, and other components which have the highest possible precision characteristics.

THE STEEL PRODUCTS ENGINEERING CO.

engineers and manufacturers • Springfield, Ohio

Accelerated Activity Ahead in the Aircraft Industry

(*Continued from page* 61)

Appropriations for military aircraft for fiscal year 1953 were again more than $14 billion, bringing the total funds appropriated for this purpose since hostilities began in Korea to more than $40 billion. The magnitude of these appropriations and the disbursements to date—some $12 billion for aircraft and related procurement — emphasize two important aspects of our rearmament program: (1) the length of time required to develop and build modern high-performance aircraft; and (2) the increased unit cost resulting from inflation and the attainment of tremendously increased aircraft performance. Little of the fiscal years 1952 and 1953 appropriations have been used for the aircraft delivered to date, and, as a result, the unfilled backlog of orders for military aircraft is on the order of 20,000 units scheduled for delivery from 1953 to 1955.

Mobilization Program Effects

Of signal importance in the mobilization program was the decision taken in 1951 to "stretch out" aircraft production. As a result of this action, projected peak production rates were reduced, and the aircraft on order were scheduled for delivery over a longer period of time. The "stretch-out" had the immediate effect of releasing a greater quantity of materials for the civilian economy. It slowed the rate of expansion within the industry and reduced the number of planes delivered during 1952. As a result, the date for completing the organization and equipping of our expanding air arms with modern planes was postponed from late 1954 to early 1956.

The expansion of the production base, which had been accorded the first priority in the mobilization effort throughout the first two years of Korean hostilities, continued during 1952. Plant construction was virtually completed, although minor additions continued to be made to plant capacity for the manufacturing of aircraft parts and electronics. As the year came to a close, second sources for fabricating complete airplanes and engines as well as for producing major components and equipment had largely completed their production planning and organization and were devoting major attention to deliveries.

These two actions—the "stretch-out" and the virtual completion of the "production base expansion"—were largely responsible for the improved availability of machine tools, materials, and manpower. The volume of machine tool deliveries is now such that it no longer jeopardizes the aircraft industry's efforts to meet schedules. Earlier in the program, the critical shortage of tools was the most serious bottleneck in the aircraft expansion program. In great measure, the machine tool problem was alleviated as tool production increased and the "stretch-out" of aircraft production in some cases diminished immediate demand. The importance of the availability of machine tools to ex-

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK

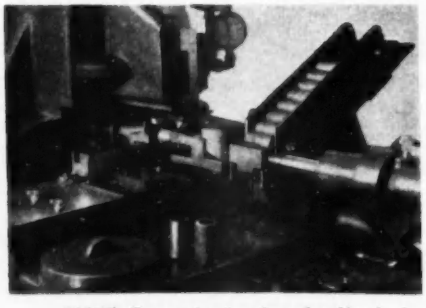
AUTOMATICALLY-LOADED *Lo-swing* IMP handles various length and diameter bushings

Problem: Turning and facing *both* ends of a variety of bronze bushings on automatically loaded lathe. Bushings to vary in length and diameter, and to come to machine rough cast with hole broached.

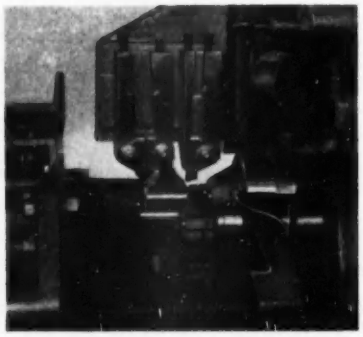
Solution: Bushings are loaded onto an expanding arbor by a plunger which picks up the bottom bushing from the inclined chute shown in upper illustration. A movable stop locates the bushing on the arbor and then withdraws to allow tools on the Third Slide (see lower illustration) to face *both* ends of the bushing to length. Simultaneously, the Front carriage tool turns the O.D. A stripper kicks the finished bushing off the arbor and into the unloading chute while tools are returning to starting position.

When bushings of another diameter are to be turned, ease and quickness in change-over are provided. The operator merely changes the arbor loading plug, makes a quick adjustment to take care of longitudinal tool travel, and resets the tools. If there is sufficient change in bushing diameter to necessitate a different spindle speed, a change of easily-accessible pick-off pulleys makes this a simple operation. The loader chute is made adjustable to accommodate various bushing lengths and diameters.

The Lo-swing IMP worked out very well on this job due to the availability of the Third Slide for the facing operations, thus leaving the rear of the machine open for loading and unloading. Tungsten Carbide Tools were used on this job with speeds and feeds set accordingly. Other inherent IMP features, such as rigidity, accuracy at high speeds, and ease of change-over contributed also in large measure to the satisfactory solution of the job.



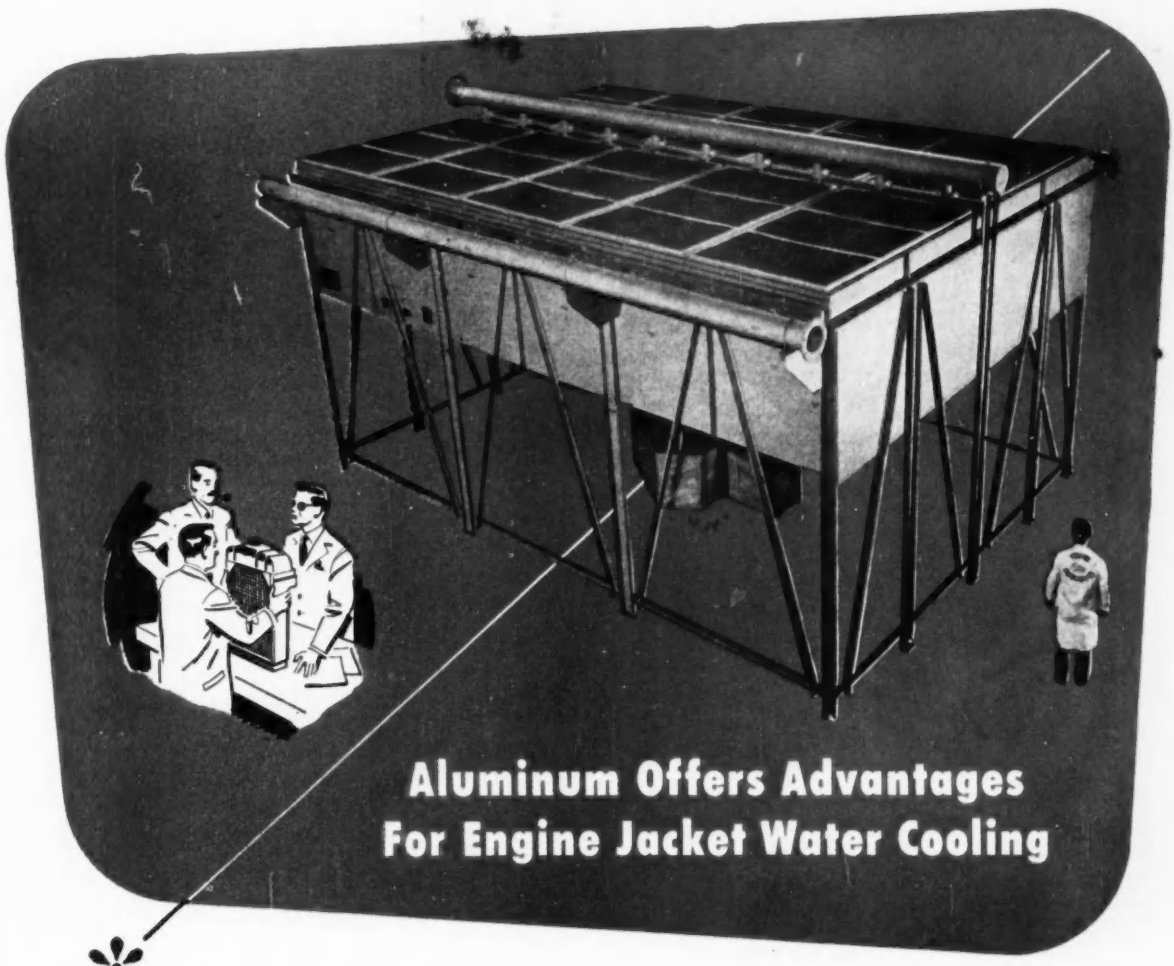
ABOVE: *Close-up view from front of machine showing Loader Chute and Loading Plunger.*



BELOW: *Close-up view from rear of machine, showing Movable Stop and clear view of tooling.*

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*



Aluminum Offers Advantages For Engine Jacket Water Cooling

Small or large, engine jacket water cooling problems are basically the same. In the Young "HC-1725" heat transfer unit, shown above, there is proof that aluminum can help solve these problems . . . proof that aluminum is worthy of the serious consideration it is now receiving for automotive radiators.

"We are using aluminum for heat transfer surface every place we can," reports the Young Radiator Company of Racine, Wisconsin and Mattoon, Illinois, in reference to their "king size" units that efficiently and economically cool water, oil and gases and condense steam and vapor. This statement is based on Young's reasoning that aluminum can do as good a heat transfer job *at less cost* than other metals. They are also well aware that, unlike copper, aluminum ore (bauxite) is plentiful and production facilities are expanding, so that supplies of aluminum will be adequate for generations.

Radiators are only one of the many potential automotive applications for aluminum. In addition to the growing list of already established uses, there are many more for which aluminum's advantages should be weighed. Besides being in an excellent, long range availability position, aluminum provides light weight with strength, durability, ease of fabrication, resistance to corrosion, natural attractiveness, flexibility in finishes and a number of other specific advantages of interest to automotive designers and engineers.

Consult Reynolds Aluminum Specialists about your automotive design or production problems. They will be more than glad to work with you in planning for your future with aluminum. For their help, or for a free folder on "Aluminum Applications in the Automotive Industry," write Reynolds Metals Company, 2587 South Third Street, Louisville 1, Kentucky.

REYNOLDS METALS

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

COHRLASTIC
fabric 3016
gaskets
FOR THE FAMOUS
WASP MAJOR

When Pratt & Whitney Aircraft engineers were searching for a superior rocker-box gasket for the *"World's most powerful piston engine,"* they selected COHRLASTIC 3016 . . . a new "wonder" material made by a special process of impregnating glass fiber with silicone rubber. This unique rubber-like sheeting is level-coated, smooth-finished, soft and resilient with low compression set and high dielectric strength. It withstands oxidation and exposure to lubricating oils at temperatures as high as 450°F.

At −70°F gaskets of natural rubber and most synthetics freeze and shatter; around +200°F they oxidize, soften, disintegrate. COHRLASTIC gaskets stand arctic temperatures down to 100 below and engine heats up to 500 above, hot oil, vapors and other rugged service conditions of flying at higher altitudes, faster speeds, longer distances. These gaskets can be counted on to last the full 800 to 1000 hours before engine overhaul.

COHRLASTIC 3016 is a heat resistant material consisting of glass fabric coated with white silicone rubber.
DESIGNED for operating temperatures ranging from −100°F to +500°F.
RESISTANT to mild alkalies, mild non-oxidizing acids, most salts, mineral oils, oxygenated solvents, air and water.
STRENGTH TESTS: Bursting 378 lb psi; breaking, cross 200 lb pi; length 250 lb pi.
STOCKED in rolls 36" wide; thickness 0.016"; weight 19 oz. psyd.
AVAILABLE by the yard for fire curtains, ducting, conveyor belts, or to order as finished die-cut gaskets ready to use.

Write for swatches and date sheets

COHRLASTIC
420 EAST STREET
NEW HAVEN, CONNECTICUT
Connecticut

panding our defense production in times of crisis indicates a need for a more effective solution of this fundamental problem.

The expansion in basic production of steel, aluminum, and other materials, coupled with reduced requirement rates, has, in the aggregate, markedly improved the materials situation within the industry. Certain materials, especially those used for alloying purposes and for high temperature resistance, remain in short supply. At present, nickel-bearing steels and aircraft quality titanium are outstanding examples.

As a result of the expansion in production of basic materials, the end of the Controlled Materials Program in its present form can be expected. However, some system must be devised to assure that the termination of CMP will not adversely affect the flow of certain critical materials to defense production.

Military Aircraft Production

The imposition of military security restrictions on defense production information precludes the release of detailed information on the industry's production activities. However, reports and statements from Government sources do provide a basis for estimating military aircraft deliveries over the past three years.

Since Korean hostilities began, more than 15,000 military aircraft of all types have been produced for our air arms and those of our NATO allies. By years, the estimates are as follows:

1950—slightly less than 3000 (of which some 1500 were built after June, 1950.)

1951—more than 5000.

1952—approximately 9000.

Civil Aircraft Production

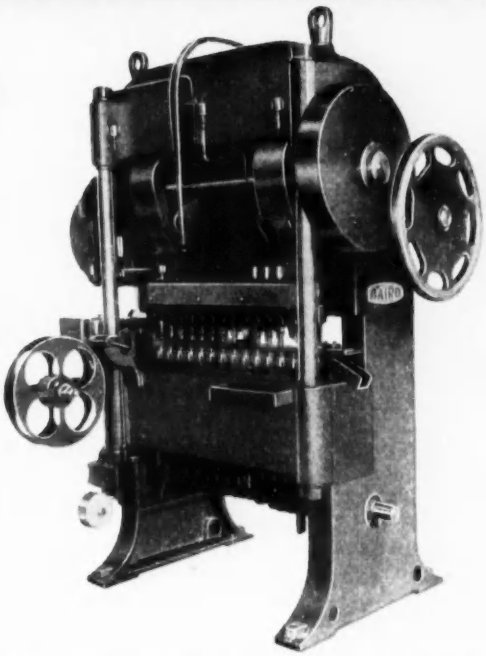
This level of production activity for the military represents approximately 95 per cent of the aircraft manufacturing efforts, despite increased production of commercial transports, which were turned out at the second highest rate in history, and the increase in the production of utility aircraft. Transport aircraft production for the year is estimated at some 400 units, of which about 240 were twin-engined executive types and 160 were 36-passenger or larger types. Despite this near-record production, unfilled orders were in excess of 400 units at the year's end.

In the utility airplane field, production was increased by approxi-

ASK **BAIRD** ABOUT IT!

HIGH PRODUCTION TOOLING

BAIRD MULTIPLE TRANSFER PRESS completes window shade part in one operation . . . 60 pieces per minute

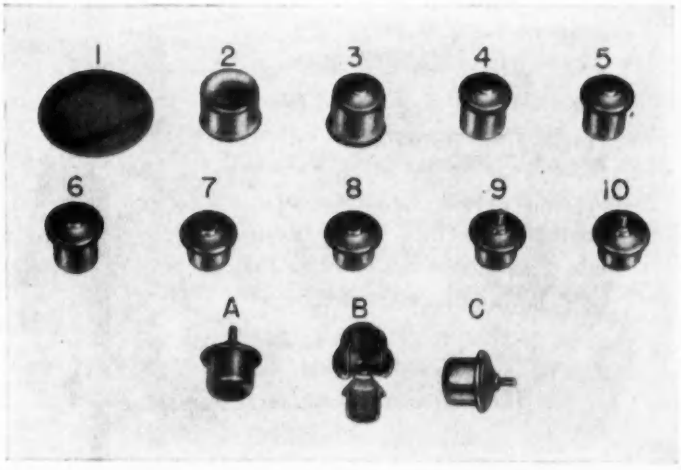


The Multiple Transfer Press is standardized in 12 sizes, with rated working pressures from 5 to 55 tons. Coiled stock (2½" to 4" width) is automatically fed to the press and, after completion of the stroke, the work quickly progresses to die stations by means of transfer fingers. Operations for which we can tool your job may include blanking, drawing, piercing, embossing, slitting, trimming, broaching, sizing, hexing, forming, etc.

Simply stated, the press combines, in a single cycle, operations that might otherwise require several smaller machines with an operator for each. Note the interesting job shown below . . . typical of many set-ups that turn out millions of parts at extremely low cost.

SEQUENCE OF OPERATIONS 10-STATION DIE SET

This window shade part is completed in one operation, as shown at "A" and "C". A 10-station die set is used. "B" shows part cut open to reveal the section. The part starts at station No. 1 by producing the blank. Drawing and forming operations continue to station No. 7, where the final sizing takes place. At No. 8 a hole for the pin is pierced; at No. 9 pins are automatically hopper-fed to the work, assembled and riveted. Stamping of the Trade Name is performed at No. 10. Material is C. R. S. zinc plated. Production: 60 pieces per minute.



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SEND FOR TRANSFER PRESS BULLETIN

the **BAIRD MACHINE COMPANY**
STRATFORD • CONNECTICUT

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Vinco is mass producing component parts for him

His full enjoyment of dinner at home is never spoiled by worries about component parts when Vinco is producing them. He knows the parts will be delivered as promised and will meet all specifications. This confidence is reflected by manufacturers throughout the metal working industry. As a result, Vinco has been forced to expand its production facilities. The next time you have parts to be machined to loose or close tolerances, call Vinco.

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THE TRADEMARK OF DEPENDABILITY

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MILLIONTHS OF AN INCH FOR SALE

mately 33 per cent over 1951 production. The increase in unit production of utility aircraft from 2477 in 1951 to an estimated 3200 in 1952 was marked by an even greater percentage increase in airframe weight as more and larger utility aircraft were sold for business purposes. Helicopter production was at an all-time high and constantly increasing throughout the year. Since the preponderance of all helicopter production was for military customers, information is not available as to numbers produced. As the year came to a close, the dollar value of the helicopter manufacturers' backlog was well over $500 million and production for civil purposes was increasing.

Guided Missile Production

In addition to the activities of the industry in the piloted airplane field, 1952 saw the placement of the first large-scale production orders for guided missiles. The 1953 fiscal budget provided $536 million for this purpose for the Air Force and the Navy. In addition, several hundred million dollars were appropriated for missile procurement by the Army. With many of the aircraft manufacturers engaged in this field, a substantial and increasing portion of the companies' manufacturing and engineering activities were being applied to guided missile development and production.

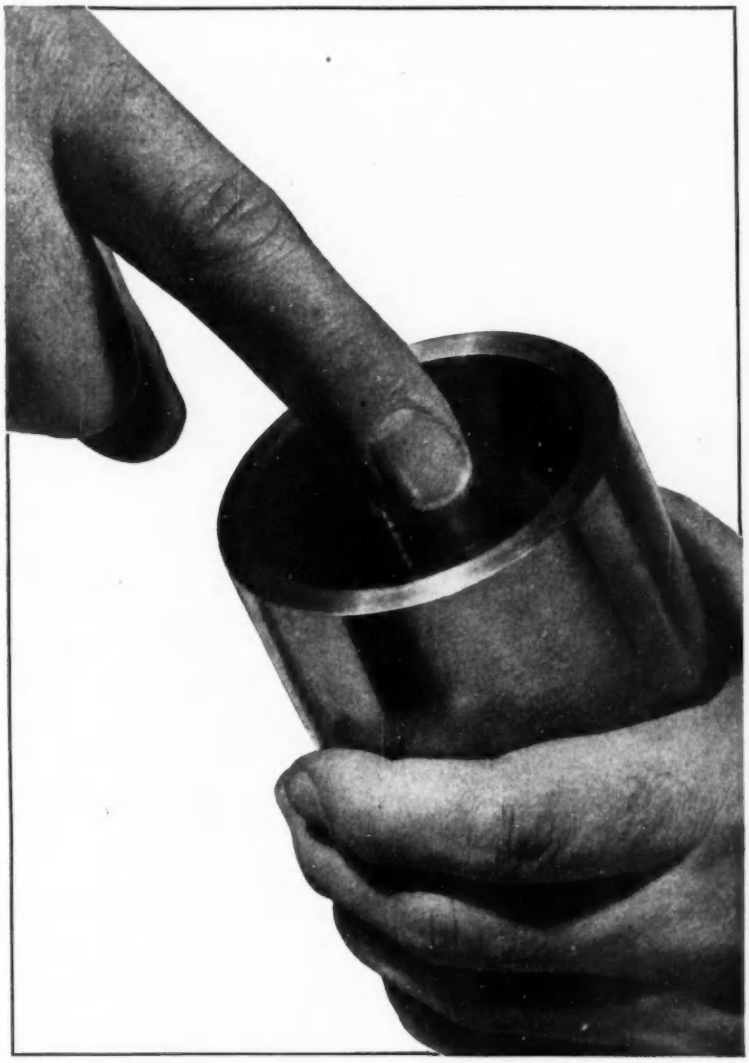
Employment

One of the best available measures of the increased activity of the aircraft industry is to be found in employment statistics. More than 715,000 direct workers were on industry payrolls in August of 1952, according to the Bureau of Employment Security. It is estimated that by December the direct employment had increased to approximately 750,000. This is approximately a three-fold increase in direct employment since June, 1950, and compares with 1,300,000 direct workers in aircraft production at the World War II peak. Counting subcontractors and major suppliers, it is estimated that more than 1,000,000 workers were employed in aircraft production at the year's end.

Finances

Sales volume of the fifteen largest aircraft companies is expected to exceed $4,300,000,000 in 1952, compared to 1951 sales of $2,606,000,000. This represents an increase of 65 per cent in the past year and is the largest

Save steel and machining time— let us do the hole job



THE center hole's already in Timken® seamless steel tubing. Less metal to machine away saves machining time and gives you more parts per ton of steel.

Finish boring is often the first step, releasing screw machine stations for other operations and providing greater machine capacity without adding costly machines.

And by using the Timken Company's tube engineering service, you can save even more steel. Our engineers will study your problem and recommend the most economical tube size for your job, guaranteed to clean up to your dimensions.

Since the piercing process used to make Timken tubing is basically a forging operation, it produces uniform spiral grain flow and refined grain structure. You're sure of fine forged quality in your product.

And the Timken Company's rigid quality control insures uniformity from tube to tube and from heat to heat.

For more information about the use of Timken seamless tubing, write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

volume of sales reported by these companies since World War II.

Profits for the year are estimated at $95 million for a 2.2 per cent of profits to sales. This low level of profits to sales—compared to the 1951 average of 6.2 per cent for all manufacturing industries—again points to the need for increased financial strength coupled with a long-range aircraft procurement program if the aircraft industry is to possess the financial health and stability required to maintain the manufacturing-engineering teams and the research and development activity essential to the production of today's complex high-performance aircraft.

Research and Development

Appropriations for these purposes in the last three years have been substantially increased, with $1,303,000,000 provided for the Air Force alone. In the fiscal 1953 budget, for example, the Air Force received $525,000,000 for research and development, compared to $238,000,000 in 1950. Because of the lengthy design and development processes, these funds will have no immediate effect in improving the quality of the aircraft or components now coming off production lines. They will, however, enable the industry to add substantial increments of performance to new weapons now on the design boards.

Despite the comparative small amounts appropriated for research and development in the immediate post-war years, several outstanding achievements were recorded by American-built aircraft during the past year, among which were:

1. The establishment of a new official world's speed record of 699.9 mph by a combat-equipped jet fighter.

2. The successful first flight of two long-range, eight-engined, jet bomber prototypes.

3. The use of in-flight refueling techniques—permitting crossings of the Pacific and Atlantic oceans by entire jet fighter wings.

4. The successful flight of a new jet and rocket propelled research plane, which achieved a speed of 1238 mph. This plane also set a new unofficial altitude record for man-carrying aircraft of 79,494 ft.

5. The award of contracts to two airframe companies and two engine companies to develop atomic powered aircraft.

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Not only in precision ball bearings, but in countless other places, Strom has found that the right ball will do the job better. Maybe your problem can be solved with the use of the proper ball. Why not take it up with Strom.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

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Largest Independent and Exclusive Metal Ball Manufacturer

Heat Treating Axle Components

(*Continued from page* 49)

vestibule, from which the loaded trays are removed onto a lowerator and into an oil quenching tank equipped with two built-in agitators. The quench tank is so designed that at a later date immersion tubes and burners may be installed for hot oil quenching.

At the end of the furnaces a slot door is provided to facilitate removal of parts such as ring gears which must be die quenched to hold dimensions. The slot door is provided with a flame curtain to prevent contamination of the furnace atmosphere.

Erection of the three furnaces in a row, and location of Gleason quenching presses in a bank at the end of the furnaces, provides a very flexible arrangement. Loading of the furnaces can be varied to take full advantage of their capacity and of the desired metallurgical results.

The fourth carburizer is a three-

LO-X Duct's scarf-lap joint slashes installation costs

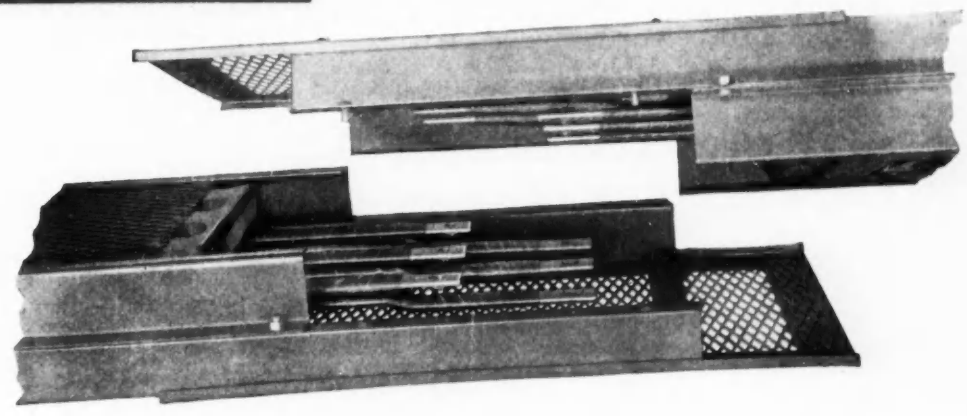
Before you select a bus duct system, be sure to check carefully into installation costs. For it is here, *with BullDog LO-X BUStribution Duct*, that you can make important savings in man-hours, money and materials.

Here's why: BullDog's *exclusive, patented* scarf-lap joint, described below, greatly simplifies installation. Makes LO-X Duct easier, faster to install; gives you a stronger, more rigid system. You save *substantially* on initial installation, and again whenever your plant layout is shifted.

When considered along with other famous BullDog features, low voltage drop and low operating temperature, this reduction means BullDog LO-X Duct will bring you *rock-bottom* current-carrying costs per ampere per foot.

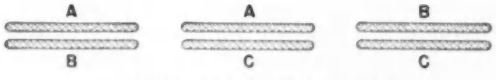
Why not call in a BullDog Field Engineer or your nearby BullDog supplier for *all* the facts? LO-X Duct is used for feeder and welder circuits, carries up to 4000 amperes at 600 volts or less. Ask, too, about BullDog Plug-In Duct for branch circuits. Free literature available by writing direct.

HOW IT WORKS:



SCARF-LAP JOINT—One half of each LO-X casing extends 14" beyond other half; overlaps adjoining casing end to form a highly rigid scarf-lap joint. Casings lap together simply, quickly . . . save countless installation hours. No splice plates, bulky joint covers, or complicated construction to slow down the job and increase costs. No poor bus bar connections, either.

Bus bars overlap also, are bolted with splined steel inserts and special spring cup washers. Joint stays tight, whatever the current or temperature variations.



End view showing staggered-phase arrangement of bus bars in LO-X Duct.

PAIRED PHASING—Another LO-X *plus!* Bus bars are closely spaced inside ventilated casing and arranged in paired phases that neutralize magnetic fields, assure uniform current distribution all along bus bar. Current flows more evenly, voltage drop and temperature rise are reduced.

BULLDOG

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
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1902 TO 1952 . . . SERVING INDUSTRY FOR 50 YEARS WITH FINER ELECTRICAL PRODUCTS

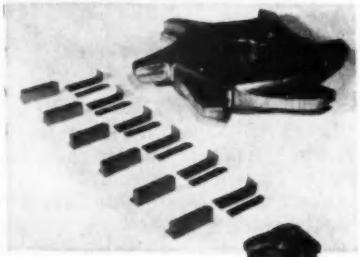
WHAT IT IS
An EASY-FLO NO. 3 coating on each side of a copper shim—in a 50/50 ratio of alloy and copper. Flow point is 1270°F. EASY-FLO NO. 3 is the silver brazing alloy, long a favorite for mounting cemented carbide tips and recommended by leading tip manufacturers.

WHAT IT'S FOR
It's the fast, easy, low-cost way to mount cemented carbides for applications calling for a "sandwich" type braze such as big lathe, planer and shaper tools, milling and form cutters, broaches, etc. Preplacing the alloy and copper all in one piece instead of three, saves a lot of time and labor.

WHY IT EXCELS
The EASY-FLO NO. 3 makes its usual high strength joints while the copper acts as a shock absorber. The combination assures joints capable of withstanding the big stresses of heavy duty cutting—amply proved on actual rock drill bits and on big milling cutters as shown at left.

FORMS AVAILABLE
STRIP from ¼" to 2" wide, and SHEET from 2" to 4". Overall thicknesses of .010", .015" and .020" and heavier. Also in precut shims to fit standard carbide tip sizes.

WHERE YOU CAN GET IT
From any Handy & Harman distributor. There's one near you. If you can't locate him, write for our "Distributor List."



Mounting carbide tips is a cinch when you use EASY-FLO NO. 3 TRIMETAL. After cleaning tips and tool surfaces, use a precut shim, or cut shims to fit, preplace them and heat. Anybody can be readily trained to do it. Illustrations show work of this kind being done at the Modern Corporation, Detroit, Michigan.

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row Surface Combustion furnace capable of handling 740 lb of work per hour. The furnace is of essentially the same design as the three described above, except for the discharge arrangement. At the side of the discharge end is a fabricated steel quench hood completely encasing the furnace discharge door and sealed in the oil of the quench tank. The loaded trays are transferred from the furnace onto a lowerator in the quench hood by means of a hydraulic pusher. The trays are moved across the bottom of the quench tank, transferred onto an elevator which brings the work up out of the oil, and thence to a spray washer erected parallel with the furnace.

Atmosphere for these and all other Surface Combustion furnaces employed in the department are provided by means of four Surface Combustion RX generators, giving a total rated output of 12,000 cfh of atmosphere gas. The gas produced by these generators consists of approximately 20 per cent CO, 40 per cent H_2 and 40 per cent N_2. Enrichment of the RX carrier gas for carburizing, dry cyaniding or carbon restoration is performed at each individual furnace.

For carburizing, natural gas is mixed with the RX in the proportions necessary to provide the desired carbon concentration. All four carburizers employ the same atmosphere arrangement. The greatest proportion on enrichment is provided in the forward zones of the furnace, just after the work has been brought up to temperature. Here the proportion of the active carburizing agent methane is very high, and the rate of carbon absorption is also high. Toward the discharge end, the methane concentration drops off, allowing for diffusion of the carbon. The net result is a carburized case of desired low carbon (.90—95 per cent C) attained in a much shorter time than could be had if the entire furnace atmosphere were adjusted to a low carbon potential.

Very thin thrust washers and other similar parts which require high wear resistance present a problem in heat treatment. For this type of part a Surface Combustion dry cyaniding furnace was purchased. It is a radiant tube, pusher type, two-row continuous furnace with a slow cooling zone at the end of the furnace proper. The heating zones are held at 1500 F and 1425 F. A recirculating fan mounted in the roof provides uniformity of heat and atmosphere. The

Bodine CASE HISTORY NO. 32

...AN AUTOMATIC ASSEMBLY OF STUD, SPRING AND SLEEVE

PRODUCTION: This Bodine No. 40-10 Dial Type automatic assembly machine produces 1500 completed parts per 50 minute hour at 30 strokes per minute. One operator can attend several machines. Top view shows tooling with 3 Syntron type hoppers to feed stud, spring and sleeve. Tolerance held to overall height of ±.008. Our engineers provide an overall service to solve your specific problems with Bodine automatics and tooling for drilling, milling, tapping, screw insertion and assembly.

You can't meet Tomorrow's Competition with Yesterday's Machine Tools

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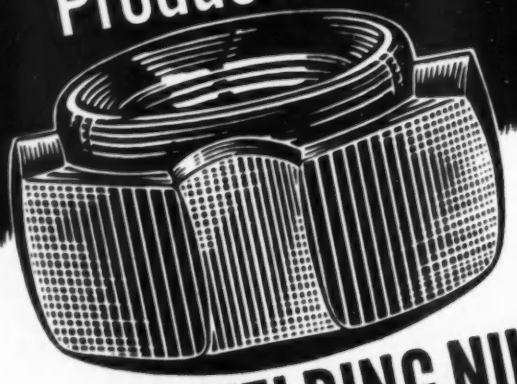
AUTOMATIC DIAL TYPE DRILLING, MILLING TAPPING, AND SCREW INSERTING MACHINES

18052

BIG in Efficient Production Plans



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Yes, Midland Welding Nuts play a big part in the assembly of metal parts. In dozens of plants they are helping materially to increase production—saving time and money—because they simplify the attachment of metal parts.

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Effective in "BLIND SPOTS"

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With Midland Welding Nuts anchored to parts in inaccessible positions, bolts are turned into these nuts without needing any device to hold the nut from turning.

5/8" F-2016-A

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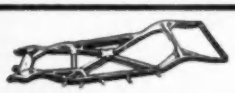
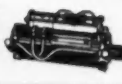


Air and Vacuum POWER BRAKES



Air and Electro-Pneumatic DOOR CONTROLS

slow cooling zone is separated from the heating section by a hydraulically operated steel door. The trays are moved through the heating zones by a hydraulic pusher. When the door at the end of the heating zone is raised, a pullout mechanism transfers the last tray in each row into the cooling zone. The water-cooled chamber slowly cools the work to approximately 500 F.

Atmosphere for the furnace is provided by a proportioning unit for RX and natural gas, plus an ammonia metering device. Parts as thin as 0.060 in. are given a very hard, extremely wear resistant case 0.004 in. thick and, due to the slow cooling process, are free of distortion.

For heat treating such parts as housing spindles, through shafts, etc., made from medium carbon steel, a Surface Combustion radiant tube, pusher type hardening furnace is employed, complete with facilities for either oil or water quenching, and with washer and air draw furnace mounted in tandem.

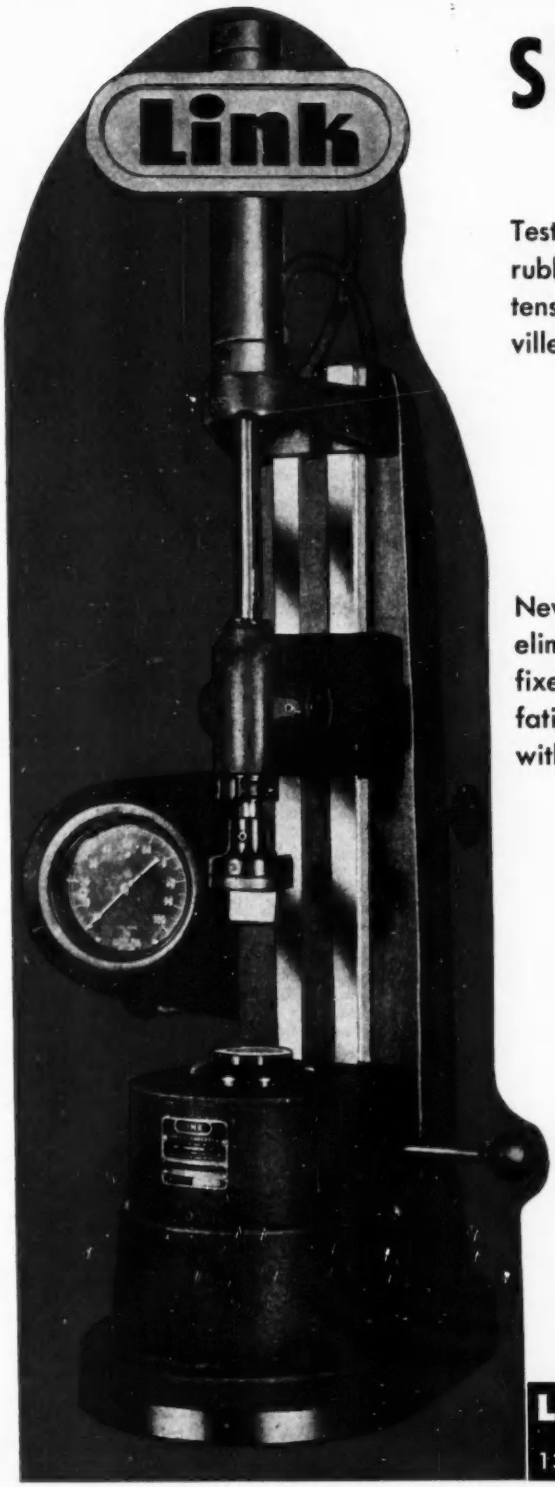
The hardening furnace is provided with a charge vestibule and a suitable discharge mechanism to seal off the furnace from contamination of air. Furnace atmosphere and vestibule pudging are provided by RX gas from the central bank of RX generators. Natural gas additions, if necessary, are provided by a proportioning mixer at the furnace.

The great majority of work is oil quenched, and for this a quench hood sealed in the oil of the quench tank, lowerator and transfer mechanism are provided at the end of the furnace. The trays come out of the oil quench directly onto the washer-air draw line which also is hydraulic pusher operated.

For water quenching, a vestibule is provided on the side of the furnace opposite the oil quench transfer and washer-air draw line. A tray dumping mechanism outside the vestibule door discharges the work into the water quench tank. The work drops into a quenching chute, and onto an inclined piano hinge conveyor which removes the work from the quench tank. Water quenched parts are loaded into boxes, transferred and loaded manually into the air draw furnace.

An "S" shaped arrangement of equipment for hardening, drawing and shot peening rear axle shafts is employed. A Holcroft walking beam type clean hardening furnace is capable of heating up to 60 shafts per hour. Heating is by means of radiant tubes, and atmosphere is provided by

PRODUCTION SPEED
with Laboratory Accuracy



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Tests any resilient material — including cork, felt, rubber, sponge rubber, springs (for compression, tension, torsion) piston rings, motor mounts, Belleville washers.

Your Choice of Gauges — "GO" or "NO-GO", or Reading Directly in Pounds

New principle cuts hand and eye motion 60%, by eliminating height measurement. Height remains fixed, regardless of load. This reduces operator fatigue and cuts cycles to about TWO SECONDS, with air cylinder type tester, as illustrated.

Hand Operated Types Also Available

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Other Link Products

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- ★ Continuous Indicating Lubricating Oil Consumption Scale
- ★ Platform Scales
- ★ Torsion Testing Machines
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Representatives wanted—write for open territory

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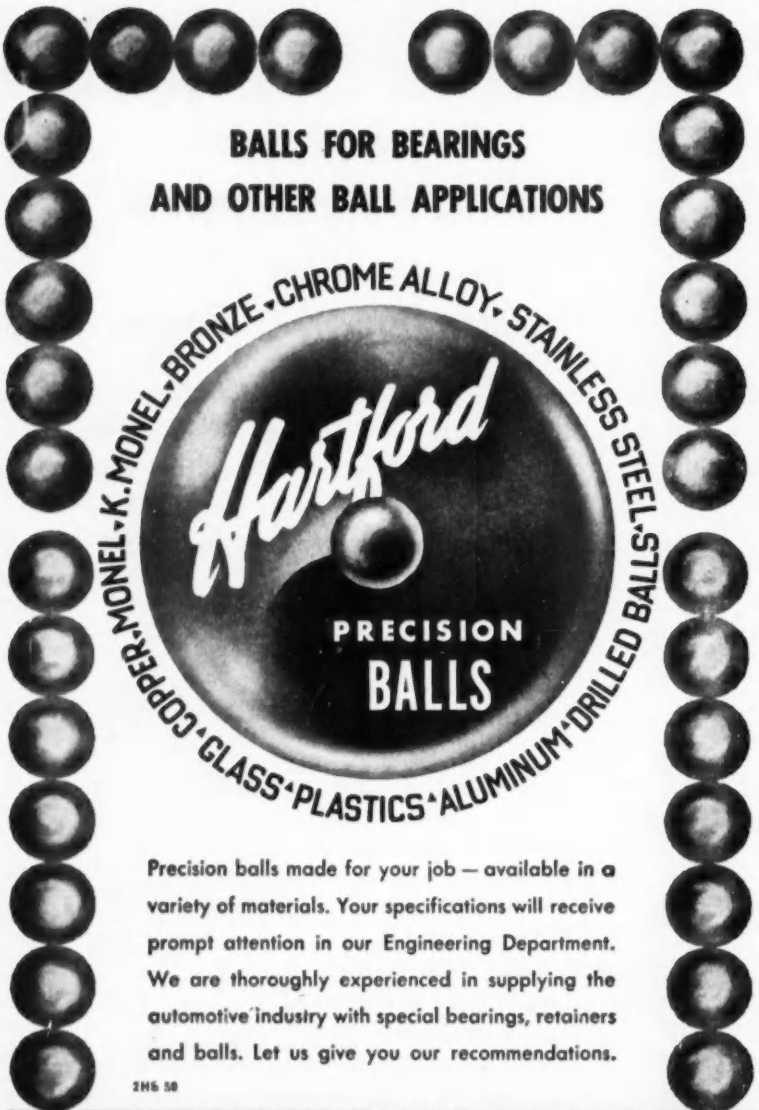
a Holcroft gas generator producing a GA Type 302 gas. Shafts made from SAE 1046 steel are heated to 1550 F and caustic quenched between pressure rolls in a Gogan quenching machine. The thin flange section is air cooled before the quench. Grinding the shaft body before heat treatment, along with the protective furnace atmosphere and fixture quenching, has completely eliminated subsequent pickling and straightening operations.

Erected side-by-side with the heating furnace, and with its charge end adjacent to the discharge end of the heating furnace, is a Holcroft chain conveyor recirculating air draw furnace for tempering the axle shafts at 450 F. After the draw, the shafts are shot peened in an American Wheelabrator cabinet with screw-type conveyor, for maximum service life. Several small box furnaces and an Ajax-Hultgren salt bath hardening furnace provide facilities for small lots of special jobs which cannot be handled in the continuous equipment. A complete copper plating system is available for carburizing stop-off on portions of certain parts.

Induction heating is rapidly finding more and more applications in present day heat treating practice. Recognizing the substantial savings and product improvement that is attainable with this method of heat treatment, equipment is being installed and soon will be operating for the induction hardening of differential spiders, shifter forks and large helical final drive gears.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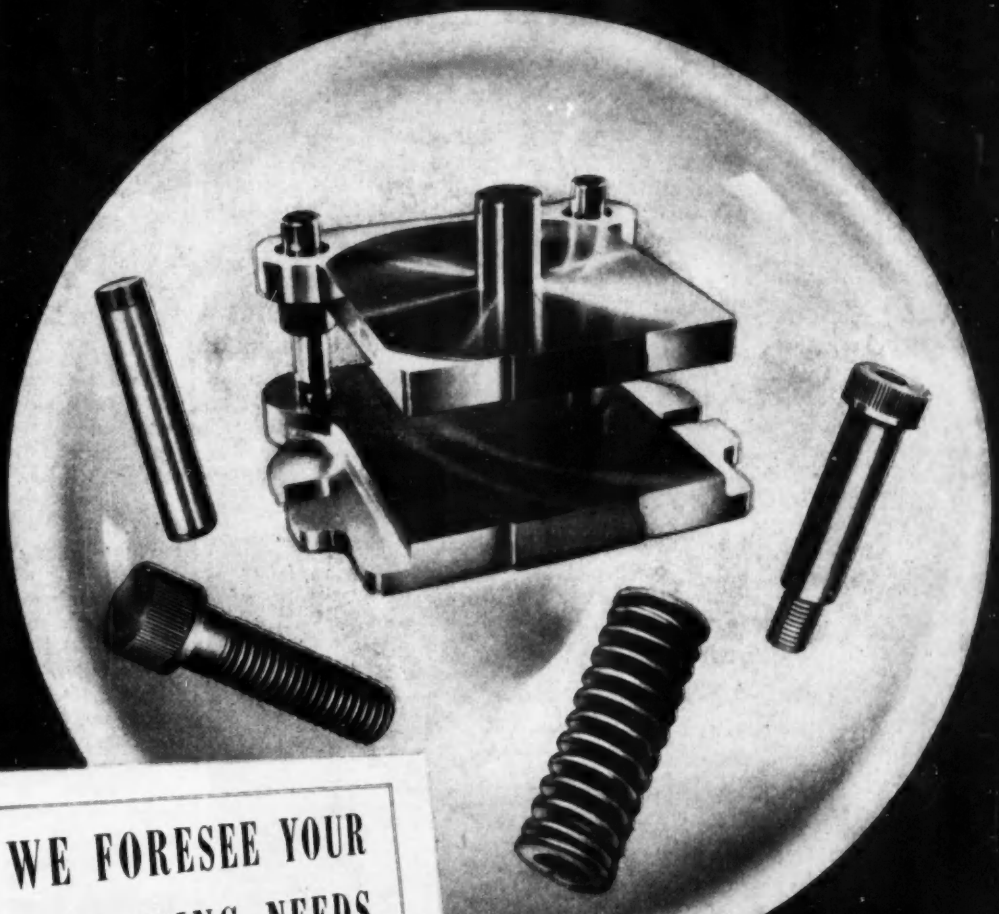
BOOKS...

THEORY OF ELASTICITY AND PLASTICITY, *by H. M. Westergaard, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y., and Harvard University Press, Cambridge, Mass. Price, $5.00.* The third book in the Harvard Monographs in Applied Science, this work presents the fundamental concepts and mathematical relationships of the theory of elasticity, including stress, strain, displacement, Hooke's law and the basic equation of elasticity. Some of the special topics treated are Lame's stress ellipsoid, Mohr's circles, octahedral stress and strain, compatibility, cylindrical coordinates and the simplest laws of plasticity. Methods of application of the theory of elasticity to certain types of problems are then offered, and such tools as the strain potential, the Galerkin vector and the twinned gradient are used. Among the other problems discussed are: hollow cylinders and spheres, rotating discs, thermal stresses, the problems of Kelvin, Boussinesq, Cerruti and Mindlin, as well as problems involving cavities and deflections of surfaces. An interesting feature of the 176-page book is a concise historical introduction.

ELASTICITY IN ENGINEERING, *by Ernest E. Sechler, published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. Price, $8.50.* One of the latest works in the field of elasticity, this 419-page volume is intended to bridge the gap between strength of materials and theoretical considerations of elasticity. While the subject matter was chosen largely to meet the needs of aeronautical structural engineers, its treatment is considered to be sufficiently broad to be of interest to civil and mechanical engineers as well. The text has been divided into three distinct sections. The first one is concerned with fundamental equations and assumptions underlying the whole field of elasticity. The second part deals with the elastic properties of stable structures, showing where exact solutions are possible, and indicating the types of approximate solutions. The third section covers the problems of unstable elastic structures. Mathematical methods of matrix and tensor analysis are offered as valuable tools for the solution of more complex problems, such techniques as the Hardy Cross and relaxation methods being frequently employed to get approximate answers where exact equations are difficult, if not impossible, of solution. The combination of theoretical background and practical application should prove to be of invaluable help to practicing engineers.



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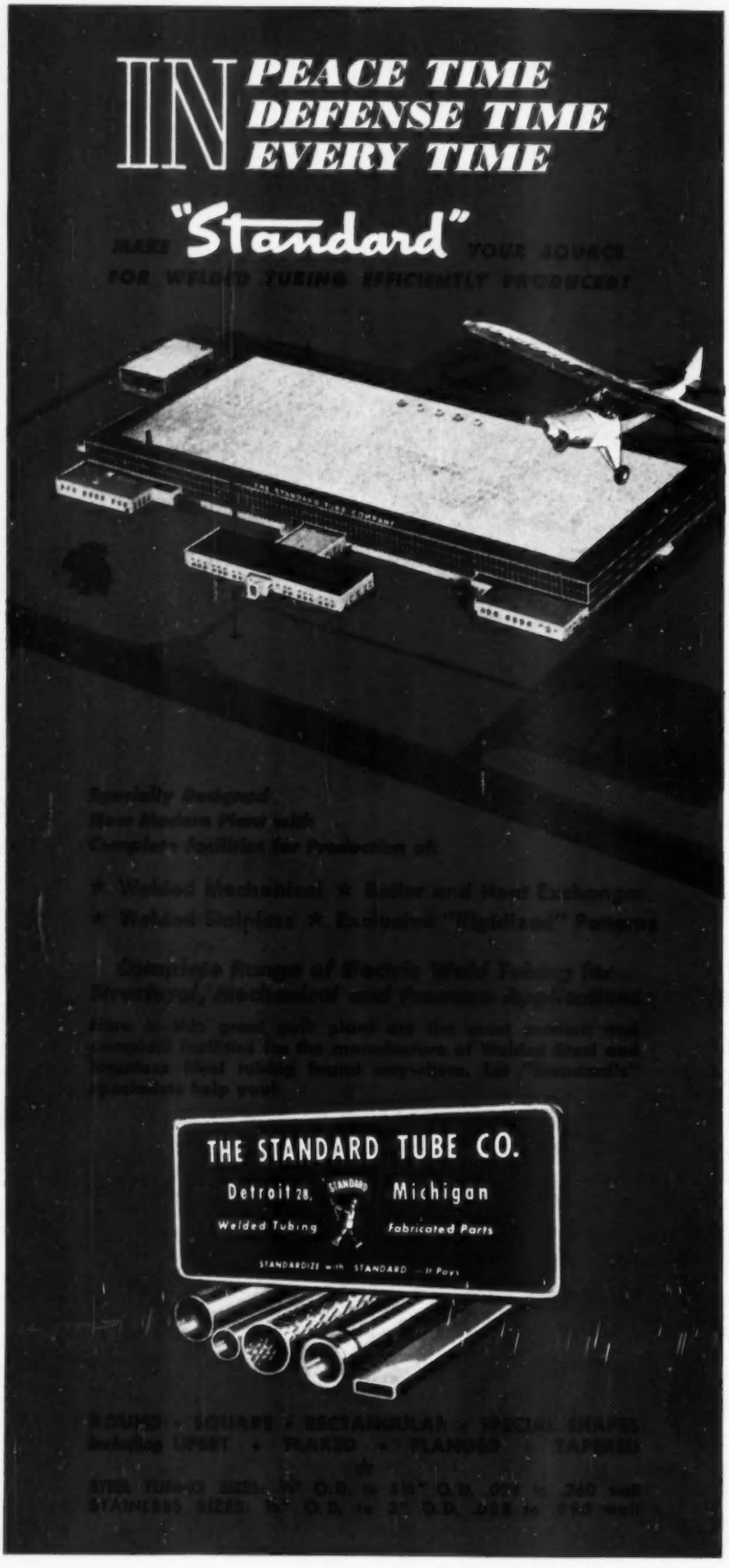

New Products

For additional information please use postage-free reply card on page 81

(*Continued from page* 80)

Cold Cleaners

Recently developed for industrial metal cleaning is a process employing cold cleaners that may be used at room temperature in power washers. The Houghto-Clean 439 and 440 are said to combine effectively to remove such soil as heavy drawing oils, pigmented drawing compounds, sulphurized cutting oils, rust preventives, and polar type smuts from ferrous metals, copper, and brass.

Since no heat is required, the cold cleaning team reportedly lowers operating and maintenance costs. Other advantages claimed are: long-lasting stability for extra economy; protection against rust; and simplicity of preparation and use. *E. F. Houghton & Co.*

Circle P-9 on page 81 for more data

Ignition Improver

Now available is an ignition improver for Diesel fuels which consists of a mixture of primary amyl nitrates. Called DB-36, the additive is said to be designed to help refiners produce the desired grades of Diesel fuel simply and economically.

Blended into the fuel in minute amounts, the compound reportedly increases the tendency of the fuel to ignite. It is claimed that this improvement in ignition quality, which is measured in terms of cetane numbers, is possible with all types of Diesel fuels. *Ethyl Corp.*

Circle P-10 on page 81 for more data

Safety Light Kit

Recently announced is a highway safety light kit for use during nighttime road troubles. A six-v sealed-beam headlamp snaps into a steel stand which tilts at a good working angle. Power is supplied through a 12-ft extension cord which plugs into any standard cigarette lighter socket.

Also included in the kit is a reflector "Caution" sign which can be placed on the road as a warning to approaching motorists. *Westinghouse Electric Corp.*

Circle P-11 on page 81 for more data

(*Turn to page* 138, *please*)

Panel of bare 24ST Aluminum, untreated. Extensive corrosion after 168 hours in salt spray.

Panel of bare 24ST Aluminum, treated with Bonderite 710. No corrosion after 168 hours in salt spray.

Panel of bare 24ST Aluminum, treated with Bonderite 710. In excellent condition after 1008 hours in salt spray.

SALT SPRAY TESTS SHOW CORROSION RESISTANCE

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Here's the surface treatment that practically ends the problem of corrosion on aluminum. Even on high-strength alloys, most susceptible to corrosion, Bonderite 710 protects bare metal for amazingly long periods without failure. Its performance as a base for paint is outstanding.

Bonderite 710 produces an amorphous chromate coating on aluminum surfaces. It can be applied by spray, immersion, or brush, on sheets, castings, forgings and extruded and rolled forms. It operates at low temperatures and is sludge-free.

Bonderite 710 is a liquid—safer and easier to handle, easier to use, more positive in results.

This product's performance equals (*exceeds*, in most important requirements) the government specifications for chemical treatment of aluminum and its alloys.

For bare corrosion resistance, or as a corrosion-resistant base for paint, investigate Bonderite 710 for aluminum.

SEND FOR FREE TECHNICAL BULLETIN—Write today for FREE illustrated bulletin on "Bonderite 710 for Aluminum".

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BONDERITE—corrosion resistant paint base
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PARCO COMPOUND—rust resistant
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**Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.*

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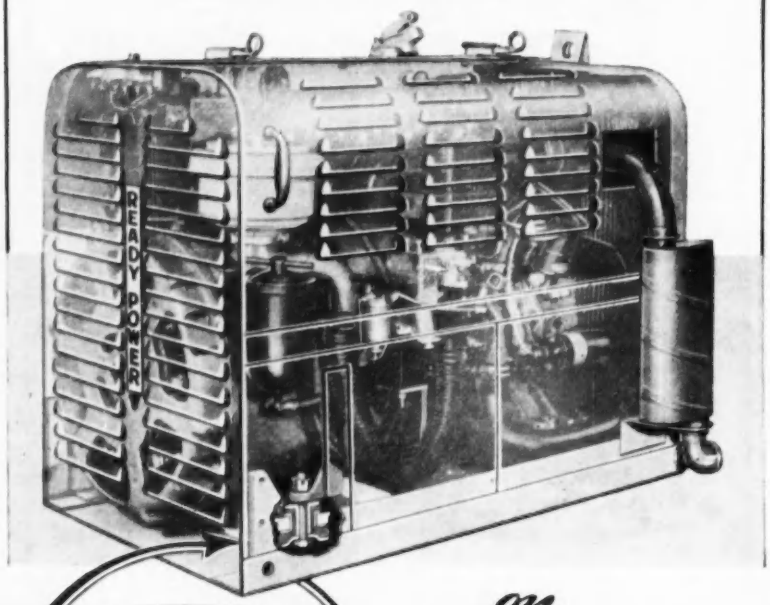

on

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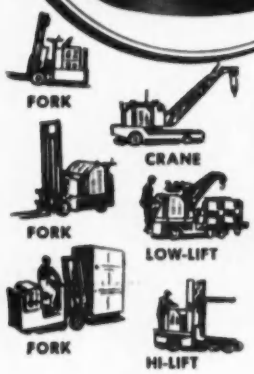
"Live Power Units"

LORD Shock Mountings accomplish two vital objectives in the delivery of "Live Power" generated as needed directly on the truck chassis of industrial fork trucks, tractors, cranes and locomotives by Ready Power Units.



1. The upper Lord Mounting J-4497-2 absorbs the unusually high "g" shock loads encountered in industrial lift truck service . . . At the same time it is rigid enough to prevent excessive engine motion due to these destructive shock loads.

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METALS

(*Continued from page* 86)

down to 83,100 tons at the end of the month. However, this still remains at an uncomfortably large figure in contrast with 23,400 tons at the end of April.

Some observers believe that the high deliveries of zinc in November were caused in part by completion of back orders which were deferred during the steel strike and therefore do not represent all new business. There may be something in this as unfilled orders on hand were slightly lower than at the end of October.

Nevertheless, sentiment in the zinc trade has distinctly improved. The current 12½ cent per lb price is generally admitted to represent cheap zinc, considerably less than is required for many domestic mines to show more than a break-even basis. Producers appear quite willing to accumulate zinc at this price rather than to press it for sale.

The main uncertainty in the situation is London, where zinc trading will be resumed January 1 on the Metal Exchange. Pessimistic statements made in November by the Minister of Materials, to the effect that zinc might follow the same course as lead when trading began, have been pretty well discounted. It now appears that his Government will release only a small part of the huge stocks in the British stockpile, estimated at about 150,000 tons. The zinc stockpile is about twice the size of lead in Great Britain, hence its disposal is more of a problem without disrupting the market. Washington is reported to be working closely with London to stretch out the period of selling the Government metal with the least disturbance to domestic markets.

On the New York Commodity Market zinc futures have reflected the belief that the worst has been seen in the metal price, at least temporarily, and have shown a stronger trend for delivery in the first quarter of 1953.

London Lead Market Steadier

After declining unexpectedly from from 14½ cents to 14 cents per lb in the last week of November, the market strengthened following a firmer tone in London where liquidation of Continental stocks seems to be nearly over. Early in December the British

(*Turn to page* 136, *please*)

RAIN? you've never seen it like this!

It's not falling on you. You're in the very middle of it! And you *can't* get out of it, away from it, under cover! You just *take* it, as long as it lasts! For that reason, many planes have windshields, bubbles or canopies equipped with Inland Self-Sealing Weather Strip. It's absolutely positive . . . never leaks a single drop . . . *never endangers the pilot's ability to see!*

That's why so many cars, buses and trucks, other vehicles and structures, use Inland Strip on windshields and fixed windows. It's the basic Inland *principle* that does it . . . the natural resilience of rubber, permanently compressed . . . a seal that locks itself for keeps, without cement or binders.

Inland Strip is *best* for the builder . . . a fast, one-man, low-cost installation. And *best* for the user . . . long-lived, trouble-free, inexpensive when replacing broken glass.

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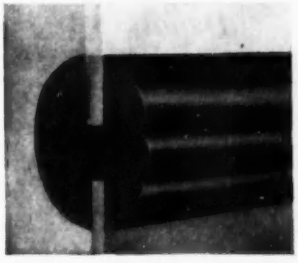
Here's how it works!

Inland Strip goes into body panel or other opening . . . glass into Strip . . . filler strip into locking channel. *A compression seal that's complete and permanent!*



INLAND MANUFACTURING

Self-Sealing WEATHER STRIP

Canada May Build 100-Seat Turboprop

Negotiations are under way between Canadair Aircraft Co. and the Bristol Aeroplane Co. of Britain, makers of the 100-seater jet-prop Britannia, to license production of this aircraft in Canada.

Large orders, both civil and military, for this transport—which has a range of 4000 mi and has been described as being well suited to Canada's maritime reconnaissance needs—are believed to be involved.

CALENDAR

OF COMING SHOWS AND MEETINGS

43rd National Motor Boat Show, Grand Central Palace, New York, N. Y. ..... Jan. 9-17

SAE Annual Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. Jan. 12-16

American Management Association General Management Conference, Hotel Statler, Los Angeles, Calif. ..... Jan. 12-15

Brussels Automobile & Truck Show, Brussels, Belgium. Jan. 17-28

Plant Maintenance Show, Public Auditorium, Cleveland, Ohio Jan. 19-22

Monte-Carlo Rally, Europe.. Jan. 20-27

12th Annual Convention, Truck-Trailer Mfg. Association, Edgewater Park, Miss... Jan. 26-28

30th International Automobile Show, Pacific Auditorium, Los Angeles, Calif. ..... Jan. 30-Feb. 8

Western Computer Conference, Hotel Statler, Los Angeles, Calif. ..... Feb. 4-6

Industrial Ventilation Conference, Mich. State College, E. Lansing, Mich. ..... Feb. 16-19

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y..... Feb. 24-27

Pacific Automotive Show, Civic Auditorium, San Francisco, Calif. ..... Feb. 26-Mar. 1

American Society for Testing Materials, Spring Meeting, Detroit, Mich. ..... Mar. 2-6

SAE National Passenger Car, Body, and Materials Meeting, Sheraton-Cadillac, Detroit, Mich.. Mar. 3-5

Geneva Automobile & Truck Show, Geneva, Switzerland ..... Mar. 5-15

National Association of Corrosion Engineers Ninth Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill. ..Mar. 16-20

German Vehicle Show, Frankfort, Germany ..... Mar. 19-29

27th Automobile Show, Civic Auditorium, San Francisco, Calif. Mar. 21-29

Eighth Western Metal Congress, Pan-Pacific Auditorium, and Western Metal Congress, Statler Hotel, Los Angeles, Calif. Mar. 23-27

SAE National Production Meeting, Hotel Statler, Cleveland, O. Mar. 25-27

International Magnesium Exposition, National Guard Armory, Washington, D. C. ..... Mar. 31-Apr. 2

2nd Annual International Motor Sports Show, Grand Central Palace, New York, N. Y. ..Apr. 4-12

Auto-Lite Easter Automobile Show, Waldorf-Astoria, New York, N. Y. ..... Apr. 6-11

SAE National Aeronautic Meeting and Aircraft Engineering Display, Hotel Statler, and Aircraft Production Forum, Hotel Gov. Clinton, New York, N. Y. Apr. 20-23

Annual Turin Automobile Show, Turin, Italy ..... Apr. 22-May 3

British Industries Fair, London and Birmingham, England. Apr. 27-May 3

Fifth Materials Handling Exposition, Convention Hall, Philadelphia, Pa. ..... May 18-22

SAE Summer Meeting, The Ambassador and Ritz-Carlton, Atlantic City, N. J. ..... June 7-12

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J. ...June 29-July 3

Eighth National Instrument Conference and Exhibit, Chicago, Ill. ..... Sept. 21-25

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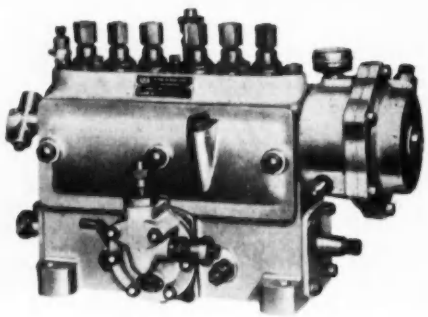

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Maintains fitting clearance from −20° F. to 200° F.

Can Be Safely Fitted to .001 Clearance, or Less . . . Without Danger of Scuffing or Seizing

You get quieter engines, eliminate cold slap and reduce friction . . . without sacrificing piston strength or conductivity. No cold slap at temperatures as low as −20° F. . . . no seizing or scuffing at 200° F.

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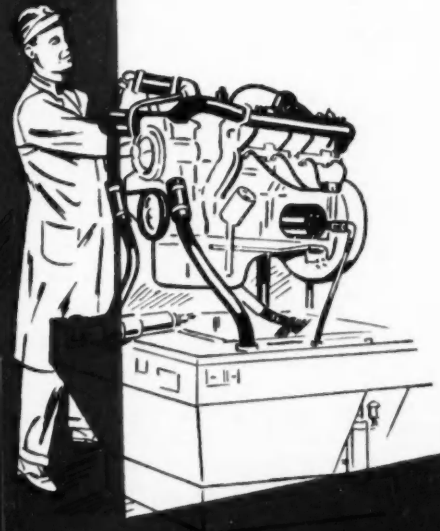

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In recent cycle tests made by one of the largest automotive manufacturers, Sterling *Conformatic* pistons were fitted into a stock engine at .0005 clearance. After operating the engine for 1200 hours, approximately half of that time at full load and full throttle, *the Conformatic Pistons were pronounced perfect.*

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METALS

(*Continued from page* 132)

market had recevered sufficiently so that it no longer was profitable to buy and sell in New York.

Lead imports for the first nine months of 1952 totaled 400,700 tons against 248,800 tons for the full year 1951. This heavy influx of foreign metal is all that is necessary to explain the sharp drop in price from 19 cents to 13½ cents within six months. Overproduction from domestic mines was certainly no factor. The latest figures show less than 30,000 tons per month of new lead mined as compared with 34,000 tons in the first quarter.

Agitation for a higher tariff on lead imports has been spearheaded by an official of St. Joseph Lead Co., principal domestic producer. His plan is for a sliding scale equalization import duty, the principal feature of which would be to maintain the current tariff of 1.06 cents per lb and then superimpose an import tax of ½ to 1 cent per lb whenever lead sells below 15 or 16 cents per lb. A somewhat similar policy would be followed for zinc. This is logical enough, for both metals usually are recovered from the same ore, and an increase of mine production of one is almost automatically followed by an increase in the other as a by-product.

Ingenious as the proposal may be, it appears unlikely that it will find favor in Washington. The new Administration will probably be unwilling to raise tariff barriers further against debtor countries.

Power Shortage Limits Aluminum Production

In theory domestic producers should have a capacity of nearly 1,300,000 tons of primary aluminum by the end of 1952. When all the new facilities are in operation in 1953 the capacity should be 1,500,000 tons or about twice the capacity they had at the end of 1950.

These are imposing figures, but unfortunately they don't do anxious domestic consumers much good today because of a factor beyond the control of the producers. In this instance, at least, the Government can't be blamed. Severe droughts in the Tennessee Valley and in the Pacific Northwest have drastically curtailed the production of hydro-electric power for the aluminum plants. It is estimated that power cuts ordered by the

Packard makes savings "A MILE LONG" with Hapman TUBULAR CONVEYORS

removing metal Chips from scores of machine tools

PLAN OF HAPMAN CHIP-CONVEYING SYSTEM AT PACKARD MOTOR CAR CO.

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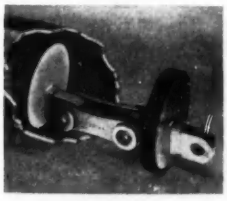
So if cutting costs is one of your problems, you can't afford to overlook the tremendous savings possible with mechanized chip-handling!

With Hapman Tubular Sealed-pin Chain Conveyors, you remove wet or dry metal chips and dust directly from machines — and convey to storage *automatically* and *continuously*. Can you imagine the multiple savings that result?



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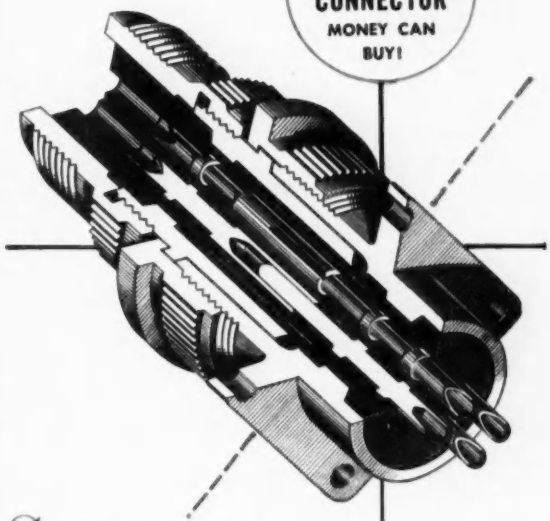

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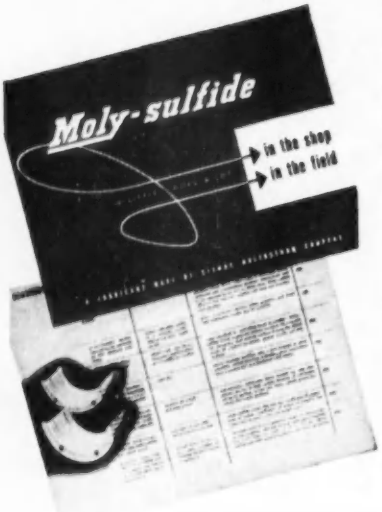
154 ideas on ways to use...



154 varied applications of molybdenum sulfide in the shop and in the field are described in a new booklet now available. This solid-film lubricant has demonstrated unique anti-friction properties under conditions of extreme pressure, high velocity, elevated temperature, or chemical attack.

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MOLY

AI-1 MS-6A

Administration will mean losses of about 20,000 tons a month or 25 per cent of the Nation's primary aluminum output.

As a result, the aluminum industry has asked the Government to suspend taking aluminum for the stockpile in the first quarter of 1953, and permit withdrawals of some stockpiled metal for manufacturers of aluminum mill products. Backlogs of unfilled orders will be up to 75,000 tons by the end of the year with delays of over a month in filling orders, it is asserted. Efforts have been made in Washington to bring in an additional 38,500 tons of aluminum from Canada in the first half of 1953 to relieve the anticipated shortage.

New Products

For additional information please use postage-free reply card on page 81

(*Continued from page* 130)

Spark Plug Tool

Now being marketed is an inspection tool for the close examination of automobile spark plug firing ends. Combining a flashlight and magnifying glass, the spark plug viewer is said to do the following: permits examination of fuel deposits; reveal incomplete or uneven abrasive cleaning; detect cracked or chipped insulator; check condition of electrode sparking surfaces; and points out need for replacing spark plugs.

The unit reportedly can be mounted conveniently near bench or servicing station by means of a ring installed in the end of the flashlight. *Champion Spark Plug Co.*

Circle P-12 on page 81 for more data

Tire Inflator

Designed to fit all tractors, trucks, buses and cars, a tire-inflating pump is said to utilize the motor as an air compressor.

In use, a spark plug is removed from the vehicle, and the pump element, equipped with the proper adaptor, is screwed into the spark plug opening. The other hose end is then attached to the tire. The motor is run at idling speed until the desired pressure of inflation is attained, as indicated by the air pressure gauge in the hose line. *Super Manufacturing Corp.*

Circle P-13 on page 81 for more data

WITTEK

NOC-OUT HOSE CLAMPS

The Standard of the Automotive Industry

Type A—Radiator Hose Connections

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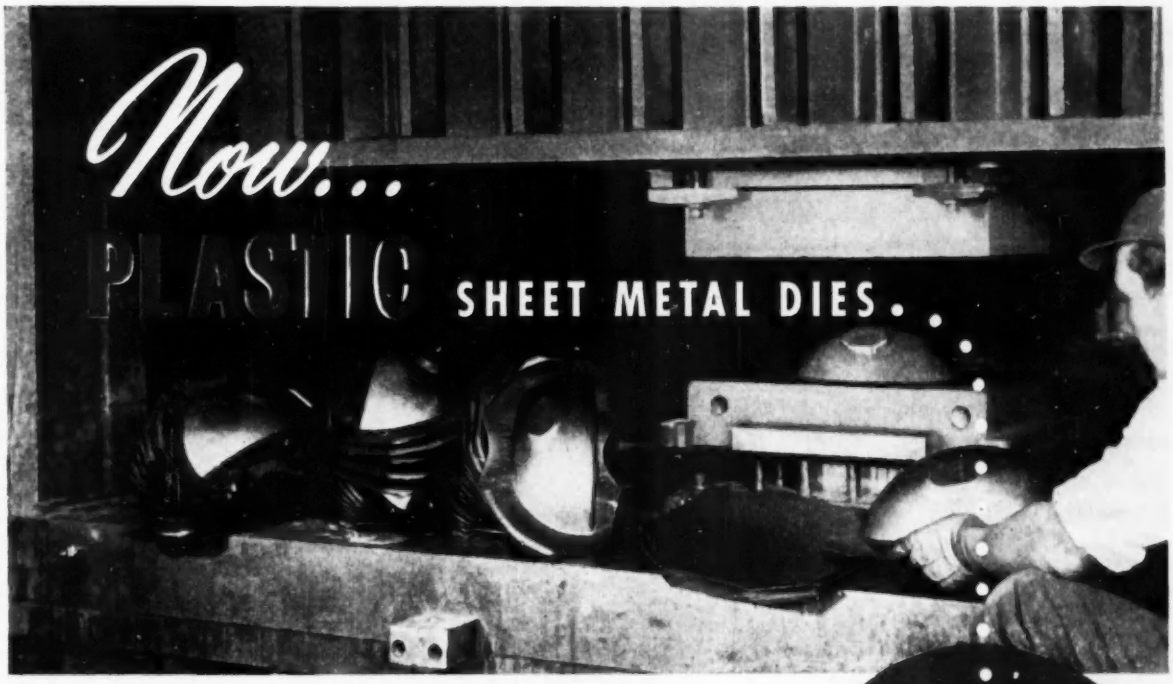

To meet the need for lowest-cost short run dies which can be produced quickly and accurately, Richard Brothers Division is now equipped to supply plastic dies.

Rezolin tool plastic material, which has proved to have good wearing qualities and stability, is being used for these dies. Because this material does not expand or shrink, dies can be made to extreme accuracy and with a minimum of final fitting and tryout. On short run production such as that illustrated—experimental flywheel housing covers of 20 gauge steel—the use of plastic dies results in definite savings both in initial cost and time required for delivery.

With the addition of the equipment and specially trained personnel required to produce plastic dies, Richard Brothers Division is now in a position to supply sheet metal dies exactly suited to any production requirement. Allite zinc alloy dies meet the needs for experimental or short run work where quantities exceed the limitations of plastic dies. For high production runs, iron dies of every type and size can be built. In many cases, combinations of materials can be utilized to provide maximum economy without sacrifice in die performance.

The best sheet metal die for the purpose . . . the most economical die for the purpose . . . can always be built for you by Richard Brothers Division. Write us for full details.

Rounding out a
COMPLETE
SHEET METAL
DIE SERVICE

Other Allied Products

HARDENED AND PRECISION GROUND PARTS • SPECIAL COLD FORGED PARTS • STANDARD CAP SCREWS JIGS • FIXTURES • R-B INTERCHANGEABLE PUNCHES AND DIES

PRECISION • EXPERIENCE • DEPENDABILITY
ALLIED PRODUCTS

ALLIED PRODUCTS CORPORATION

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PLANT 1
Detroit, Mich.

PLANT 2
Detroit, Mich.

PLANT 3
Hillsdale, Mich.

PLANT 4
Hillsdale, Mich.

TELEFLEX

MECHANICAL REMOTE CONTROLS

UNLIMITED ROTARY MOTION—The meshing of the screw-type flexible Cable and the specially hobbed gear of the Teleflex Control Box allows unlimited rotary motion.

EFFICIENCY—The unique construction of Teleflex Cable permits Teleflex Controls to operate efficiently in both tension and compression.

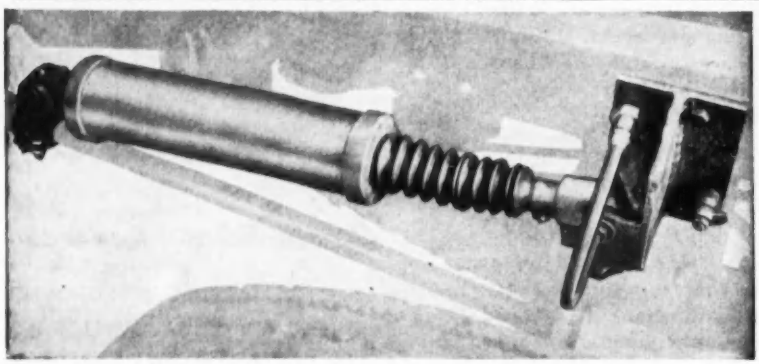
MINIMUM LOST MOTION—The close tolerance held between Teleflex Conduit and Cable reduces snaking of the Cable within the Conduit.

FLEXIBILITY—Conduit and Cable can be routed around obstructions and through areas where space is limited.

EASE OF INSTALLATION—Teleflex controls are assembled at point of installation from standard Teleflex parts. Prefabricated controls also are available.

For further information write for Catalog 3008. Engineering data for calculating operating loads and backlash is available also.

TELEFLEX INCORPORATED
185 S. Main Street
North Wales, Pa.



Air-O-Matic Power Steer Booster installed on White Truck Model 302264

AIR-O-MATIC *AIR POWER STEERING*

for

SAFE STEERING ASSIST

A self-contained unit, easily installed. Only one air line required. Low initial cost and maintenance.
Used by manufacturers of trucks, tractors, Moto-Cranes, off-the road equipment, Military and other vehicles.
Technical information furnished upon request.

AIR-O-MATIC POWER STEER CORP.
24 Noble Court N. W. Cleveland 13, Ohio

News of the

MACHINERY INDUSTRIES

(*Continued from page* 71)

R. C. Sollenberger, staff head of the organization, was re-elected vice president. Other officers who have assumed their duties are: R. F. Tomlinson, general manager, the Oliver Corp., A. B. Farquhar Div., York, Pa., vice president; Jervis C. Webb, executive vice president and general manager, Jervis B. Webb Co., Detroit, Mich., treasurer; and Fred S. Wells, vice president, Stephens-Adamson Mfg. Co., Aurora, Ill., secretary.

Around the Industry

R. D. Wood Co., Philadelphia, Pa., manufacturer of hydraulic presses and allied equipment, is celebrating its 150th anniversary this year.

The National Tool and Die Manufacturers Association has decided to produce a color motion picture to entice apprentices. Title of the production will be "The Tool and Die Maker: American Frontiersman," and it will be shown to various business organizations and in the schools.

Clearing Machine Corp., Chicago, Ill., has played the role of host twice recently. Visitors from Japan toured the plant as part of a study of American equipment and practices. The tour was conducted under the sponsorship of Amertool Services, Inc. Chicago members of the ASTE toured the plant last month, when Clearing held an open house in their honor.

While in Detroit, Mich., the Japanese group sponsored by Amertool made principal stops at the Carboloy Dept. of General Electric Co., Ford Motor Co., Gear Grinding, and Michigan Tool Co.

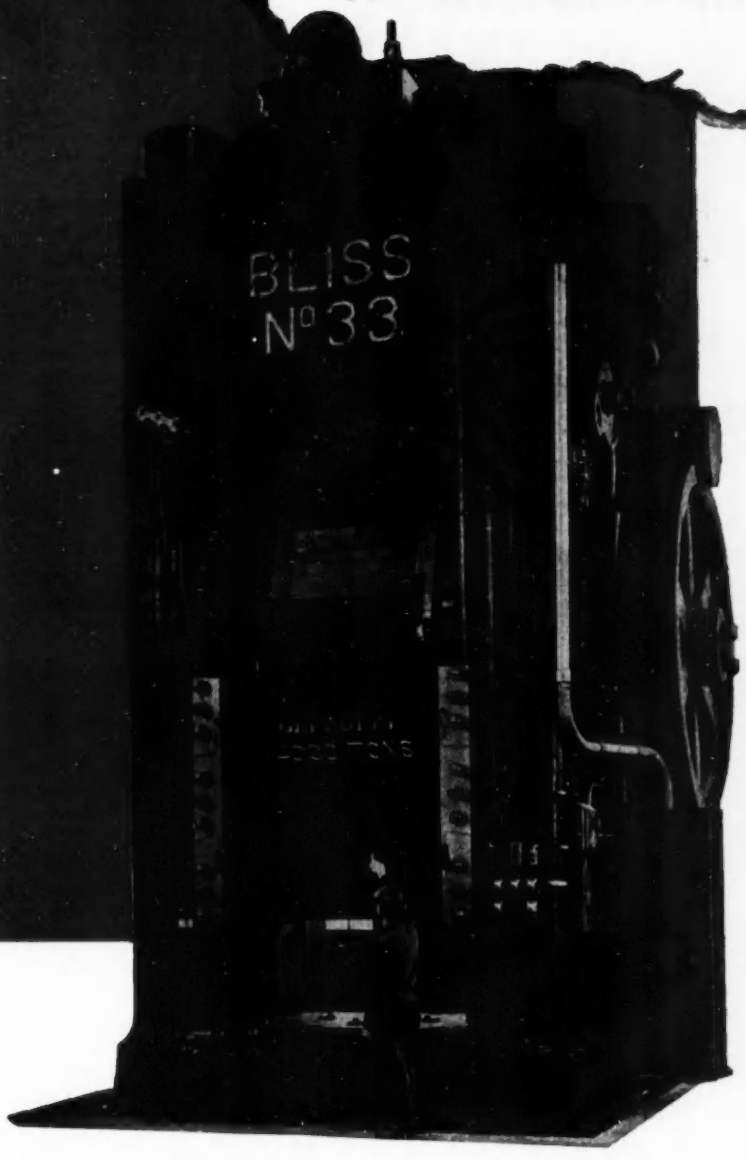
Rezolin plastic draw dies are being used for initial test runs of what is claimed to be the largest triple-action draw press in the world—an 8000-ton Birdsboro hydraulic. The Rezolin Tool-Plastik dies will draw both outer and inner panels of a large door at the same time. Lockheed will operate the equipment.

Sheffield Corp., Dayton, Ohio, has designed and built the first automatic gage for checking the dimensions of a loaded and assembled round of 90 mm ammunition.

Columbia Machinery and Engineering Corp., New York, N. Y., has acquired all of the assets and manufacturing rights of the Bridgeport Safety

(*Turn to page* 142, *please*)

The trend is to more stampings with **BLISS** *Presses*



Bliss builds world's largest knuckle-joint press for Regal Ware, Inc.

When Regal Ware, Inc., Kewaskum, Wis., needed a press to coin cups for artillery shell cases, one press builder recommended a 6000-ton hydraulic. Bliss, who builds both mechanical and hydraulic types, found that a 4000-ton knuckle-joint press would not only deliver higher production but would also cost much less.

Result: Bliss created the largest knuckle-joint press ever built, a giant standing 34 feet and weighing 305 tons.

Regal Ware's experience is a good example of how press buyers can count on Bliss' unbiased recommendations. For Bliss builds more types and sizes of mechanical and hydraulic presses than any other manufacturer. Call in your nearby Bliss sales engineer today.

Largest knuckle-joint press in the world: bed area of 60" x 70", 40-inch die space, and six-station Bliss ratchet dial feed, 59" dia., with electrical protection for safer indexing.

E. W. BLISS COMPANY, CANTON, OHIO
E. W. Bliss (England) Ltd., Derby, England
E. W. Bliss Company (Paris), St. Ouen sur Seine, France

PRESSES, ROLLING MILLS, SPECIAL MACHINERY

Branch offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. **West Coast Representatives:** Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Co., Seattle. **Other dealers** in United States cities and throughout the world.

Bliss on your press is more than a name ...it's a guarantee!

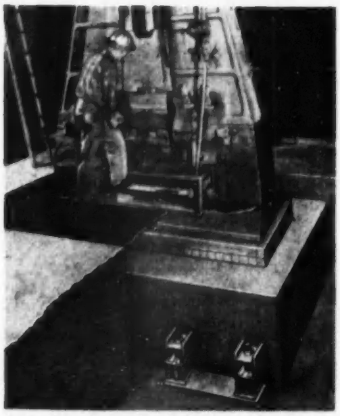
STOP VIBRATION

WITH

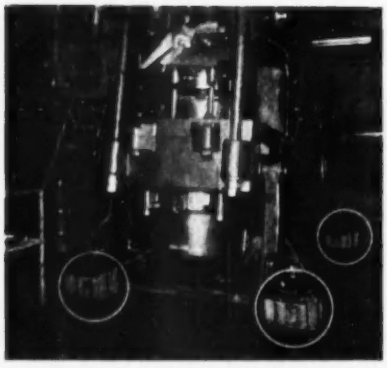
KORFUND VIBRATION CONTROL

Reducing transmitted vibration and dynamic loads with Korfund Vibration Control gives:

- **More efficient plant layout**
- **Elimination of special foundations for most machines**
- **Reduced rejects—improved work quality**
- **Increased production**
- **Reduced maintenance**
- **Reduced noise and employee fatigue**



Typical spring-isolated hammer foundation. Shock isolation is so complete that a coin will remain standing on edge beside the foundation as maximum blows are struck. Tests prove there is actually a slight increase in hammer blow efficiency.



Korfund Vibro-Isolators solved a serious vibration problem, and permitted installation of this 100 ton press on a weak upper floor in a loft building. Isolators often permit higher press speeds for greater production.

Today's precision machine tools pay off in high production to close tolerances when protected from external disturbances. Special foundations can often be eliminated with economical vibration control.

Vibration and shock transmission can be stopped at the source by mounting impact machinery such as hammers and punch presses, and mechanical equipment such as pumps and compressors on Korfund Vibro-Isolators. Accuracy of precision machines such as grinders, boromatics and jig borers can be protected against external vibration with Korfund machine tool mountings. Furnace arch and glober life can be more than doubled with protective Korfund furnace mountings.

Installation is simplified by means of Korfund Vibration Control for most machines because they can be installed on ordinary floors without special foundations. Furthermore, better equipment layout gives straight-line work flow for higher production.

Standard Korfund Isolators are available for most applications. A Selector Chart in bulletin G-105 gives recommendations for both normal and critical conditions, for hammers, machine tools, pumps, compressors, fans and most other mechanical equipment. See Sweet's Catalog Files or write us for your free copy today.

We'll gladly submit recommendations without obligation. Just contact us, or the Korfund representative you will find in most principal cities. A half century of experience is at your disposal.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

THE KORFUND COMPANY, INC.

48-02A Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal
See us at the Plant Maintenance Show, Cleveland, January 19-22. Booth #610.

Emery Wheel Co., Inc., Bridgeport, Conn., and the Diamond Machine Co., Stratford, Conn., according to an announcement by the executive office of the purchaser. The company plans to increase its volume approximately 50 per cent by the acquisition of the two firms.

Superior Tool & Die Co. has concluded a license agreement with Tarex Ltd., Geneva, Switzerland, to build Tarex single-spindle automatic screw machines in the U. S. The Detroit firm announced that the machines would be produced by Modern Collet & Machine Co., Ecorse, Mich., a wholly owned subsidiary.

SPO Inc. and Shellmold and Machine Co., Inc., New York, N. Y., have announced the completion of an agreement under which SPO's manufacturing and distribution facilities will become available to Shellmold for the production and distribution of shellmolding machinery and auxiliary equipment.

Ordnance Cuts

(*Continued from page* 34)

and will close down instead of beginning to produce the M-48 tank as had been planned originally.

The Detroit Tank Arsenal, now operated by Chrysler Corp., will continue to build M-47 tanks through 1953, but will stop at year-end. The Arsenal will take on part of the production from American Locomotive so that the two plants will close at about the same time.

Production on the M-48 tank at the Chrysler Delaware tank plant, and the Fisher Grand Blanc tank plant near Flint, will continue indefinitely although at a somewhat lower peak rate.

The Cleveland tank plant, operated by Cadillac for production of T-41 light tanks, will continue to operate but at the "minimum economic rate." An army spokesman says the production rate for 1954 will be about 22 per cent of the plant's capacity.

Reductions also have been ordered in 2-1/2 ton trucks produced by Studebaker, GMC, and Reo. Studebaker will continue at a reduced rate during 1953 and will go out of production on the trucks at the end of the year. GMC and Reo will continue producing at reduced rates beyond 1953. There has been no word about the size of the cut-back at GMC. The latest reduction in truck

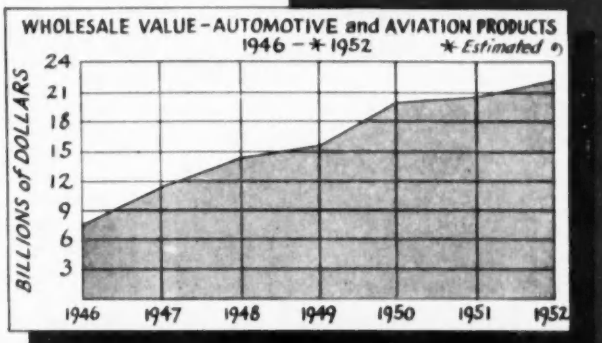
(*Turn to page* 144, *please*)

The trend is UP

A progress report on automotive and aviation manufacturing and its basic medium . . . AUTOMOTIVE INDUSTRIES

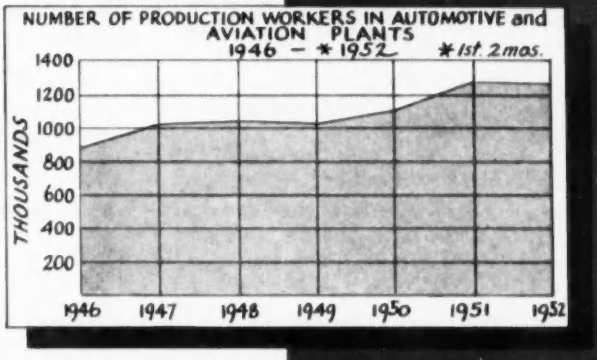
Now . . . a $21.3 billion industrial field

In seven busy years, the total wholesale value of the products made by the automotive and aviation industries has tripled! This nation-wide industrial field produces cars, trucks, buses, tractors, aircraft; their engines, parts, accessories, materials and production equipment . . . plus planes, tanks, tactical vehicles and other vital defense tools.



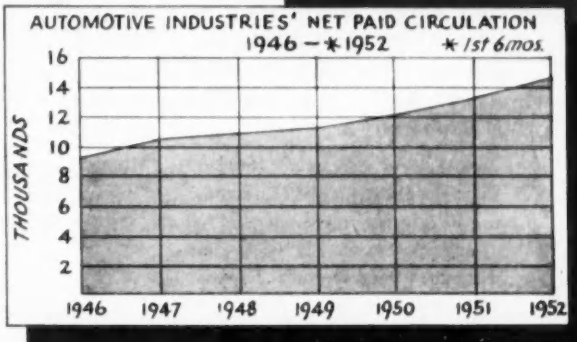
Production worker total increases 43%

Since 1946, the number of production workers in companies manufacturing vehicles, parts, aircraft, aircraft parts, tractors and engines has grown 43%, reflecting the expanding activity in the automotive and aviation industries. This vast industrial market in 1952, will buy over $11 billion worth of parts, materials, supplies and production equipment . . . and its purchasing power is increasing steadily.



Circulation up 55% and still growing

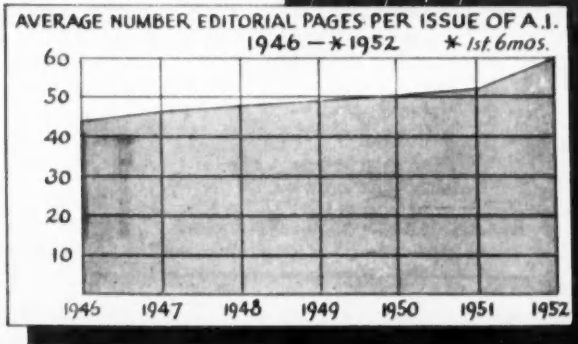
AUTOMOTIVE INDUSTRIES is subscribed to by over 14,500 design, engineering, production, administrative and purchasing executives. Coupled with this healthy growth is its strict quality control, assuring executive-level readership. AUTOMOTIVE INDUSTRIES' quality coverage places your sales message before the buying teams of 3,124 automotive and aviation plants.



36% greater editorial coverage

Both in number of editorial pages and in new features, AUTOMOTIVE INDUSTRIES has expanded greatly its editorial service to automotive and aviation manufacturing executives. Clearly and completely, it reports all the latest news in automotive and aviation design, production, and engineering, keeping pace with the numerous developments in this multi-billion dollar market.

Now, advertisers obtain a new high in selling impact . . . in depth of penetration of America's No. 1 industrial market with AUTOMOTIVE INDUSTRIES, the news magazine of automotive and aviation manufacturing.



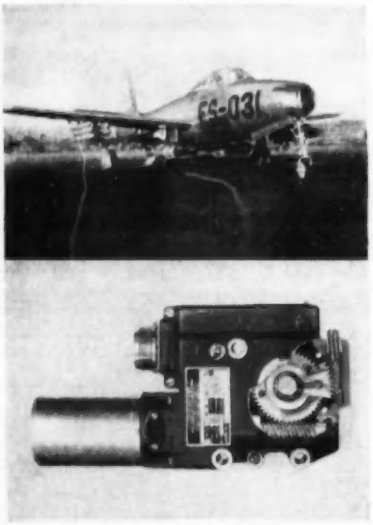
AUTOMOTIVE INDUSTRIES

A CHILTON Publication

CHESTNUT & 56th STS.
PHILADELPHIA 39, PA.

ABC NBP

Jato Release on Republic's F-84 AIRBORNE Actuated



The R-424 actuator (R-450 type) jettisons six Jato bottles after take off. The R-424 winds cables on a drum and pulls the pins.

This cutaway of Airborne's Model R-450 actuator shows the externally adjustable positive stops which, in conjunction with torque-limiting switches, provide accurate positioning at both extremes of travel. The limit may be at any value to 270°.

Projection of the splined output shaft, on both sides of the actuator, helps adapt the model R-450 to any application. The weight of this unit, with radio noise filter, is 2.7 pounds—the speed, at 26 volts and 250 pound-inch load, is 5 rpm.

See our insert in the I.A.S. Aeronautical Engineering Catalog for details on this and other Airborne actuators.

AIRBORNE
ACCESSORIES CORPORATION
1414 Chestnut Avenue Hillside 5, New Jersey

Ordnance Cuts

(*Continued from page* 142)

schedules is the second within two months. A previous 25 per cent cut went into effect Nov. 1. Reo has announced that it will cut its production about 30 per cent but that unfilled orders as a result of the extension, plus additional orders promised by the government, will assure production through the first quarter of 1955. As a result of the cuts in its military truck production, Reo is planning to go into the manufacture of metal toys, a move long contemplated. Production of toy wagons and three sizes of tricycles is expected to begin about next July.

The slow-down program implements original military planning which called for installation of tooling and production lines and then only a trickle of production to keep facilities in operating condition in the event of an emergency. Reaction of the automotive industry to the stretch-out program has been favorable. Industry spokesmen generally were reported to have welcomed the move as sound in view of constant design changes and the factor of obsolescence.

U. S. Orders Mark III Tank

Deliveries of Centurion Mark III tanks, British-built vehicles tested at length in the Korean fighting, will be made to the Dutch and Danish armies on the basis of a $90 million order placed in London by U. S. Army Ordnance.

Placement of the contract was effected under off-shore procurement (OSP) terms as part of the MDA Program. This is the biggest single U. S. off-shore order thus far in a program involving $729 million in contracts with Western European countries from fiscal 1952 funds. In addition to the tanks, the British will supply fuel trailers, spare parts, and ammunition.

The 50-ton Centurion, mounting a gun in about the 83-mm class, is standard equipment with British Commonwealth forces in Korea. Earlier this year, there was a minor international debate stemming from British claims that the Centurion is superior to the American Patton tank. These statements were denied by American spokesmen.

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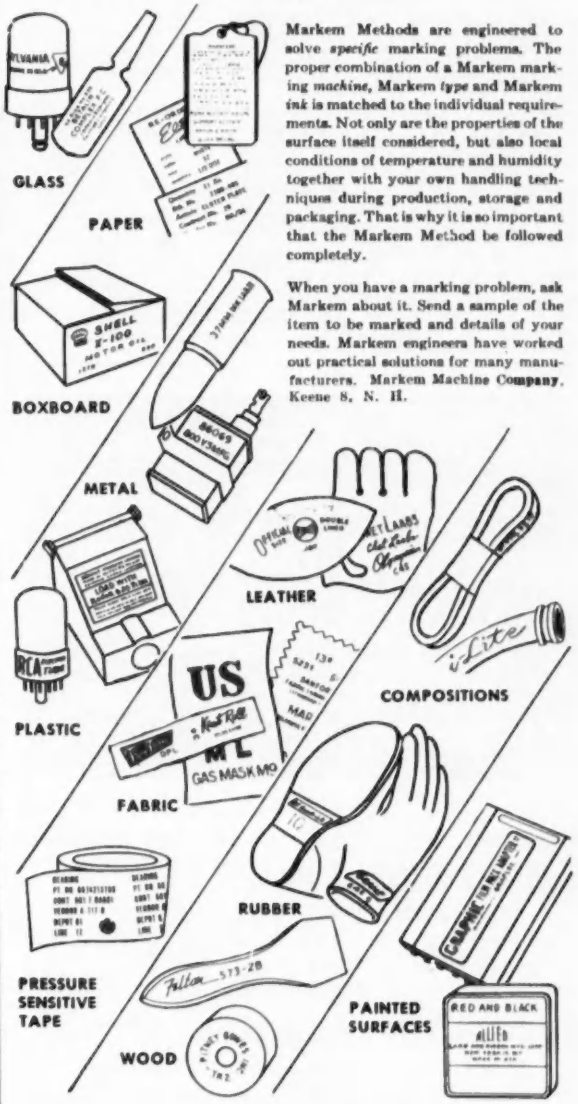

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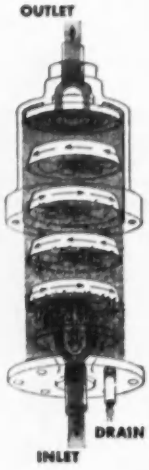

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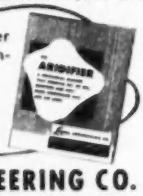

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See our full page "ad" in the STATISTICAL ISSUE p. 415

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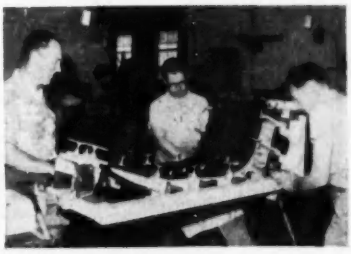
An Open Letter to Executives in charge of...

AIRFRAME Manufacturing



This message is addressed to the executives responsible for airframe assembly or fabrication who have a production problem involving such things as cowlings, wing tips, wheel doors, fairings, air-scoops & ducting, seats, ailerons, flaps, trim tabs, dorsal fins, elevators, rudders or related jobs. We operate a fine, modern and completely equipped plant for aluminum metal forming and fabrication of aircraft parts and assemblies. Our equipment and facilities include:

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4. Presses
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8. Complete tool making Facilities
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Our plant, with 50,000 square feet, is within quick hauling distance of every aircraft manufacturer and prime contractor on the West Coast. Our organization includes executives and engineers with years of aircraft experience. Work gladly accepted on negotiated or bid basis. We invite your inquiry and personal inspection of our facilities.

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President

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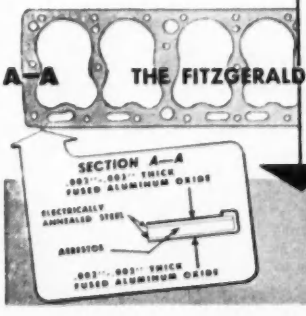

A—A THE FITZGERALD MANUFACTURING CO.
Torrington, Connecticut

FITZGERALD *Gaskets*
SINCE 1906

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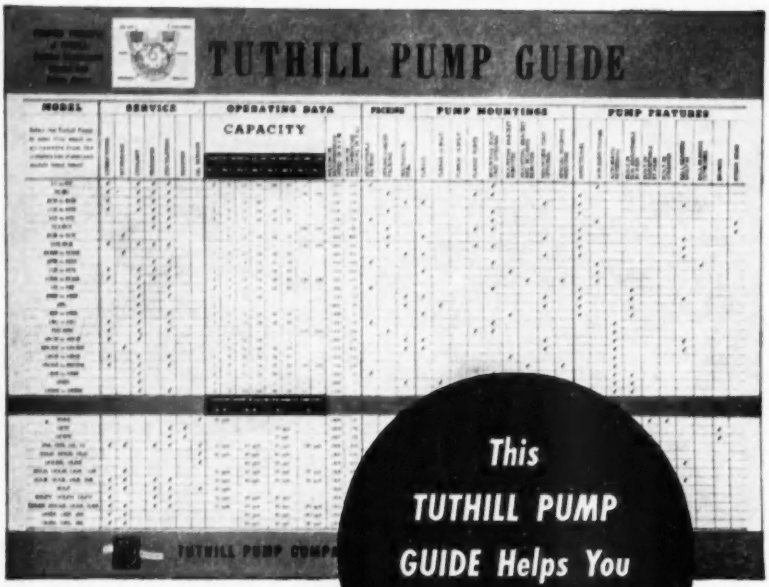

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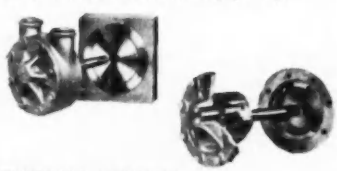

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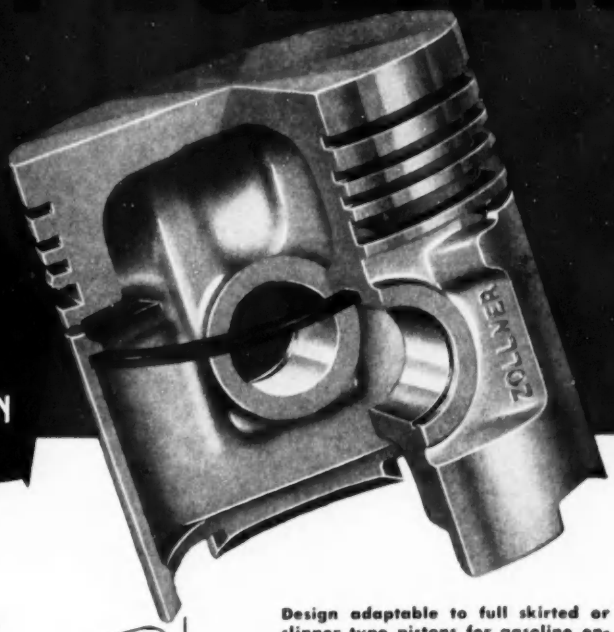

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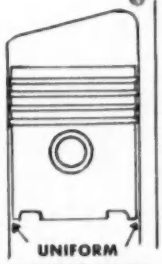

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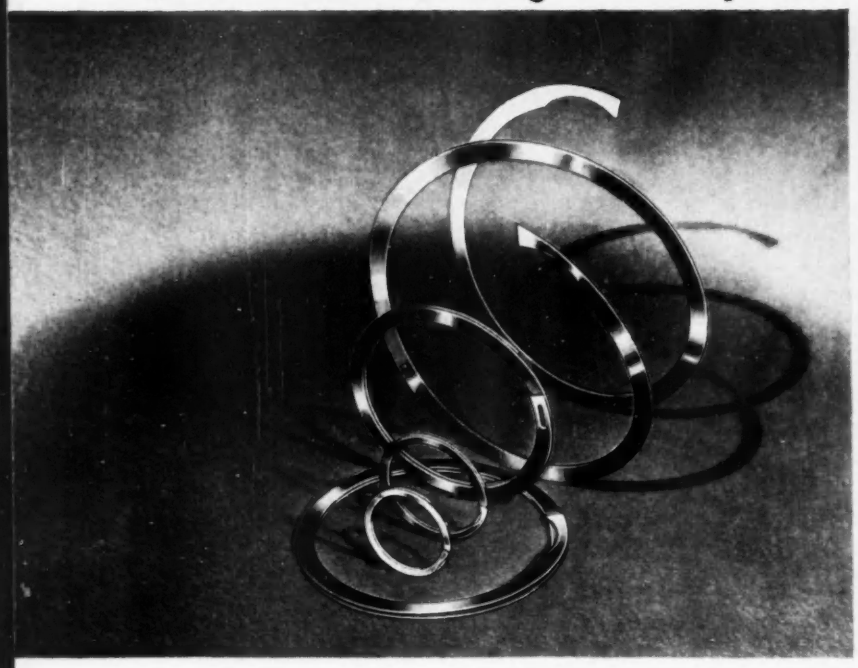

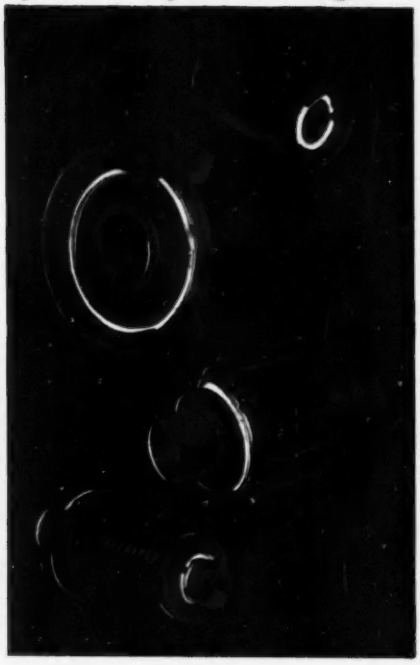

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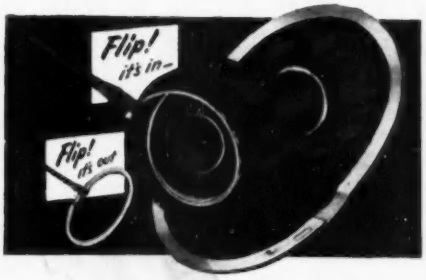

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